

G-Force Nozzles: The Inside Story

Based on a highly customizable global nozzle platform design, the unique G-Force series of fixed, selectable, and automatic nozzles combine over 40 years of Task Force Tips design innovation and experience into true next generation firefighting tools. Manufactured exclusively at TFT's USA production facilities, the G-Force series is supported by an extensive infrastructure of 24-hour technical service representatives, on-line documentation, digital video training library, exclusive product serialization and tracking capabilities, and a proven 5 year product warranty. Incorporating unique performance components such as a stainless steel slide valve, inlet debris screen and protective fog pattern choices, the G-Force series delivers high performance and rugged dependability.

Serialization provides track-ability and immediate access to on-line operational instructions

Integral Inlet Screen prevents debris from entering nozzle and affecting stream quality

Stainless Steel Slide Valve provides turbulence-free flow control when gated

Color-Coded Polymer Pistol Grip, Valve Handle and Covers offer rugged durability in harsh firefighting conditions mov.tft.com/F5

Your Choice of Fixed,
Swiveling, Threaded, Storz or
Articulating Inlet Coupling



Flush without nozzle shutdown or pattern adjustment

The NEW GLOBAL FORCE in Nozzles



For a complete list of FM Approved models visit newforce.tft.com.

NFPA #1964 Compliant Integral Tactile Indicator
provides optional preset pattern
selection or factory set lock out

Choice of:

- Fixed Metal
- Fixed Molded Rubber
- Spinning Stainless Steel (shown)

Choice of:

- Fixed Pressure and Flow
- Selectable Flow with Fixed Pressure, or
- 3 Automatic Pressure and Variable Flow Choices

Choice of:

- Tip Only
- Shutoff
- · Shutoff with Grip Models

Bonded Rubber Bumper provides maximum durability in harsh conditions

Large Index Ring with Indicator allows easy flow, pressure or flush selections with a gloved hand

Lightweight Hard Anodized
Aluminum Alloy Body includes
permanent laser engraved
operational markings and
highly visible reflective labeling



G-Force



Large Diameter Hose SUPER HOSE CARRIER

Handled by single operator!

No power source required!







Easy to load, carry, and extend LDH.





Roll up by Ratchet Handle and unload.

Storage into box by Roller Base



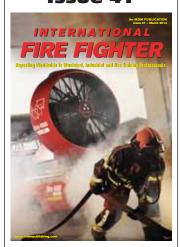
- Carrier's lightweight and compactness make it easier to transport, load, unload LDH and load the carrier onto truck easily.
 - Ratchet-type handle lever helps to roll up LDH so easily.

Model dia (mm) Max length LH-100 100-125 50m LH-150 125-150 40m LH-200 150-250 30m LH-300 250-300 20m



YONE CORPORATION
23 NISHINAKAAICHO, NISHINOKYO,
NAKAGYOU-KU,
KYOTO CITY, 604-8441 JAPAN
TEL: +81 75 821 1185 FAX:+81 75 801 2263
www.yone-co.co.jp

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Cover image: LEADER Easy 4000 large flow fan especially designed for large volume ventilation.

Publishers

David Staddon & Mark Seton

Sales Manager Mark Bathard

Contributing Editors

Dennis Davis, Dan Stephens, Ari Drougas, Jessica King, Rod Carringer, Paul Maynard, Tom Guldner, A. K. Rosenhan, Tony Pickett, Helen Crofts-Bolster, Vanessa Davies, David Dickson, Nick Brennan, Paul Hedley, Perry Simpson, Duncan J. White

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mark.bathard@mdmpublishing.com Website: www.mdmpublishing.com

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Contents



31-34

36-37

45-47

8-28 News. Company and **Product Profiles** 31-34 Urban Search and Rescue Capability

> **36-37** Eye Protection - Your First Line of Defence

39-43 Class A Foam and CAFS Training

45-47 Choosing the Right Firefighting Nozzie

51-54 vehicle **Extrication Challenge** or the Public Highway - The role of the **Incident Commander**

56-60 Stability at **Shipboard Fires**

63-64 Rural **Water Supplies - The** Oktibbeha County Way

66-68 Talkina Telemetry - past, present and future

70-72 cpr & AED -Saving lives, fighting sudden cardiac arrests

77-81 Post **Incident Support**

83-86 The United **Nations Perspective** to Search and Rescue

88-89 FIRED-UP **Project develops** innovative procurement for fire services

90 extstyle - 92 Addressing the UK's Wildfire Risk: a Collaborative Approach

94-95 Exploiting the synergies between Mariner and **Fire Fighter with** bespoke Immediate **Medical Care training**

96 Advertisers' Index







83-86



51-54



90-92

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The New Global Standard

in high-performance firefighting foam technology

StormALERT™ high performance environmentally sustainable fluorine-free foam concentrates for Class B flammable liquid fires. An innovation in firefighting foam, StormALERT™ high performance foam concentrates are fluorosurfactant and fluoropolymer free products. Formulated using high performance synthetic foam concentrate technology, StormALERT™ high performance foam concentrates are designed to replace Fluoroprotein, AFFF and AR-AFFF foam concentrates.



ALERT DISASTER CONTROL

T: +65 6545 5088 (24 Hours) E: stormalertsales@alert.com.sg W: www.storm-alert.com ALERT (Asia) | ALERT (Canada) | ALERT (Middle East) | ALERT (Russia) | ALERT (USA)



Dennis Davis CBE, QFSM

Dennis is an International specialist fire and civil protection advisor and currently Vice Chairman of the Fire Sector Federation and International Fire and Rescue Service Association CTIF. He is a former HM Chief Inspector of Fire Services for Scotland and Chief Fire Officer for Cheshire. He has served in many professional roles including Presidency of the Institution of Fire Engineers and UK Chief Fire Officers Association.

The price of being good at what we do

suspect any firefighter anywhere in the world would recognise that sense of personal value occasioned by the reply 'Firefighter' to the casual question 'What do you do for a living?'

Importantly part of that value comes from the warmth and respect given to all members of our global fire and rescue community and to all those people that serve others – we know that because it's what we ourselves offer to other emergency and aid workers.

Respect, a key part of that value, is grown from a belief that we act professionally with care and without bias to any individual – if you like it is our culture – we try to be technically the best – competent – in short 'good at what we do'.

Internationally firefighters come literally in all shapes and sizes with all the kit needed to match their tasks, climate and environment. Operating in and under every known geographic and condition known to man firefighters support fellow human beings in diverse communities each with its own distinct political and cultural heritage. We are not therefore speaking here about a "universal firefighter" but more about sharing a common identity and purpose – all of us pursuing the time tested adage of working to 'save lives and render humanitarian assistance'.

Given this perspective perhaps we can forgive or at least understand why difficult guestions like 'Could we spend less on the service?'; 'Are they up to the task?'; or 'Are there better alternatives?' are given short shrift. Equally we might be forgiven if we became introverted seeking to only support 'our people' rather than the wider troubled world. But despite the difficulties, challenges and costs involved that really is not an acceptable position to adopt. As leaders we must constantly re-evaluate assumptions and push on against the risk of creating sterile organisations that depend solely on management technique if we are to retain the capacity and capabilities to operate in what increasing remains a potentially dangerous and sometimes violent landscape.

Part of what I do is work with international colleagues; it is something that has offered rich insights and allowed many a contribution to the communities I have sought to help protect. Whether with IFE – the Institution of Fire Engineers – the USA-UK Fire Symposium or now in CTIF – the international fire and rescue service association – the outcome has always exceeded the input. Learning how the same problems are confronted differently extends our thinking, doctrines, practices and understanding.

Threats are not decreasing – in Europe between 2003 and 2012 disasters killed 80,094 citizens with losses of a €100 billion – so we all need to sharpen our act. Europe, again as an example, has not used this internal threat as a reason to withdraw from assistance to those outside its Union of 530 million, although it has strengthened its collective civil protection mandate known as the 'Community Civil Protection Mechanism'. Rather the EU has set upon ensuring its overseas aid programmes, which collectively make it the largest donor in the world, are used more effectively.

This has involved the very difficult task of devel-

oping concrete solutions, like the recent creation of the European Emergency Response Centre in Brussels and a revamped and extended European External Action Service that works closely with the United Nations and other partners, in ways that are acceptable within the non-federal continent that is Europe.

Two important words lead that sort of process – "subsidiarity" and "solidarity". They may not roll off the tongue but they spell out two absolutely clear objectives; to ensure decisions about services like fire and rescue remain 'local' determined by any nation as it sees fit and yet always working to 'voluntarily share' the work acting as good neighbours helping make a difference where it can. Any policy maker will tell you serving two masters is never easy but we live in complex times and sharing whilst protecting is critical in building capacity and capabilities to meet those threats.

What is also essential is the task of improving competency and joint working so that when services deploy they cooperate efficiently and effectively. Mutual aid therefore isn't necessarily just about the tools, accepting how vitally important good communications and having a common operational picture are; it is also about our personal knowledge and understanding and that is an individual responsibility.

It's easy to see again why this is a key feature of intra service and international cooperation and, given how important being able to think and operate outside the box is to meeting the unexpected, having deep well understood foundations of knowledge can enable dynamic leadership when its most required, when we operate outside the usual frameworks; frameworks that may be localised for say Urban Search And Rescue and elevated as in INSARAG for international work.

So can we and should we do more? Of course we should and we should also use the digital and information technology tools at our disposal to drive learning forward. Whilst there are already many e-portals, and some are very good, do we perhaps lack imagination and to some extent the finance to harness and usefully share all this knowledge to gain traction to harness even better preparedness?

There are of course initiatives in the English speaking world like the Global Fire Service Alliance that seek to build connectivity or promote good practice as with CFPA-Europe or standards like BSI and NFPA, as well as those I have already mentioned, and a plethora of bodies and enterprises that validate, qualify, contribute and stimulate. But are these right for our time? What can we learn from those outside our usual circle of alliances and friends and how might relevant information, training programmes, lessons learnt, planning templates, risk assessment, etc. be managed to make it accessible and not overwhelming?

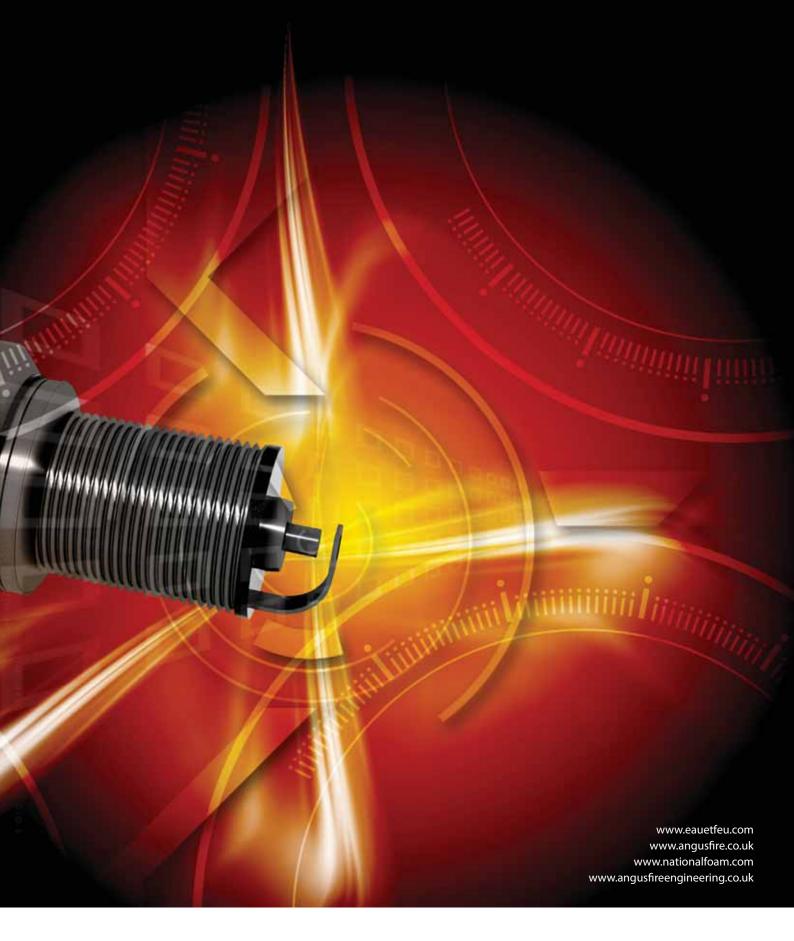
Fundamentally the mission may remain unchanged but circumstances continually shift and the rhythm of life, unless you are very lucky, is frequently disrupted and remains unpredictable. If I may finish and be so bold as to misappropriate a well-known but disputed phrase I would say that the price of being good at what we do is "constant personal improvement and eternal vigilance."





There's a new power in global fire fighting. Four major international brands have combined together to offer the most comprehensive range of products and services worldwide. We're fired up to help protect lives, property and assets, and excited about the prospects our new global strength brings to our customers.

UK-based Angus Fire, US-based National Foam and French-based Eau et Feu have a long history of fire fighting innovation and occupy a unique position in the development and manufacture of fire hose, foam concentrates and fire fighting equipment worldwide, whilst Angus Fire Engineering is a leader in the design, build and commissioning of systems worldwide.



Over the past two hundred years, we have achieved many industry 'firsts' and remain at the forefront of environmentally responsible technology through continuous investment in research and development. We supply customers in over one hundred countries. If you are one of them 'thank you'. If not, we look forward to welcoming you into an exciting future together.









Ballyclare acquires Lion in major expansion

Ballyclare has acquired the Lion firefighter business in the UK from LHD Group as part of a planned strategy for growth which puts the company at the forefront of PPE development in the fire sector.

The initiative consolidates Ballyclare's position as a leading provider of firefighter protection and signals the company's long-term commitment to the UK Fire Service.

The deal was sealed on the 2nd January 2014 and the expanded team will now focus on merging both businesses to create a stronger operation with a national UK network.

Ballyclare will integrate Lion's care and maintenance centres in Uxbridge and Livingston into its existing operations in Stockport and Barnsley, providing a nationally based service for fire and rescue services across the country. The merged business now protects over 20,000 firefighters in the UK, including Scotland, the North East and West, Wales, the South East and Eastern Services, as well as Leicester, Oxfordshire and North Yorkshire fire and rescue services.

Carlton Greener, Managing Director of Ballyclare Limited, said: "Lion is a well known brand that, like Ballyclare, has a strong reputation for service and product quality. The integration of the Lion UK business creates unrivalled strength in depth with a wide range of skills and expertise across all of our operations.

"The addition of Lion's facilities in Uxbridge and Livingston extend our network across the country and will ensure that we maintain the highest standards of service for our customers.

"Our focus remains on developing innovative protective clothing solutions that meet the specialist needs of modern day firefighting. We are excited at the opportunities that this merger brings in terms of future growth and enhancement of our products and services and are currently sharing that vision with our customers in the fire service."

"We have always been committed to working in close partnership with fire and rescue services, allowing us to fully understand their requirements and work together to develop solutions that will do the job effectively. It's a long-term relationship based on mutual knowledge sharing that results in continuous improvement in protection for tomorrow's firefighters."

"We have created a strong UK business that gives us a solid platform to expand further afield, building on the major contract won last year with the Malaysian Fire Service."

Ballyclare has an enviable track record of developing protective clothing solutions for firefighters that stretches across several



decades. With that heritage comes an impressive depth of knowledge and expertise within the team. The company is proud that all of its garments are designed from scratch. It has been recognised for award winning designs that have over the

years pushed the boundaries of innovation in protection and comfort for firefighters.

The ability to manufacture its own garments ensures that Ballyclare maintains rigorous quality controls throughout all of its processes. This is supported by state of the art IT systems that give customers access to powerful reporting and analysis helping them to manage their PPE as efficiently as possible.

The acquisition of the Lion UK business solidifies Ballyclare's position as a major force in firefighter protection with the skills, expertise and vision to deliver competitive PPE solutions that are second to none.

For more information, go to www.ballyclarelimited.com



Solberg firefighting foams achieve new ICAO test standard certification

Solberg has achieved ICAO Certification on the company's RE-HEALING foam concentrates. A range of products have achieved certification to Level B and the new Level C standard.

RE-HEALING RF3 (3%), RF6 (6%) and RF3x6 ATCTM (at both 3% and 6% solution) have achieved Level B Certification. The ICAO Level B certification for RE-HEALING RF6, 6% foam concentrate has been achieved on both the UL 162 Listed and the EN 1568 Approved product formulations. In addition, Level C Certification has been achieved on RE-HEALING RF3x6 ATC at the 6% solution rate.

The newest generation of RE-HEALING RF3, 3% foam concentrate is now approved as ICAO Level B, in addition to existing product certifications including Underwriters Laboratories (UL) Standard 162 Listed, and EN 1568 as 1A.

Customers can now purchase a single foam concentrate for all their fire protection needs. Solberg RE-HEALING foam is the future of firefighting foam worldwide. Achieving Level B Certification on our range of RE-HEALING foam concentrates is further proof of the continuing advancement of our fluorine-free technology', stated Jan Solberg, Director of Business Development for Solberg.

A specialised agency of the United Nations, the International Civil Aviation Organization (ICAO) was created in 1944 to promote the safe and orderly development of international civil aviation throughout the world.

ICAO sets the Standards and Recommended Practices necessary for aviation safety, security, efficiency and environmental protection on a global basis. It serves as the primary forum for co-operation in all fields of civil aviation among its 191 Member States.

The ICAO certification was carried out by the UK CAA through its subsidiary CAA International and provides independent third party verification of firefighting performance.

Simon Webb, the UK CAA Technical Specialist said 'This independent certification of firefighting foam is good news for prospective purchasers. They now can be assured of the firefighting performance in these witnessed tests.

For more information, go to www.solbergfoam.com



The Kore Kooler **Rehab Chair is Back**

The Kore Kooler Rehab Chair, a popular solution for reducing heat stress on the body, is now back in production thanks to a new agreement with DQE to manufacture the product.

The Kore Kooler Rehab Chair provides an effective means of lowering body temperature through hand and forearm immersion. Combined with resting and hydration, hand and forearm immersion is an effective way for firefighters and responders to lower the impact of stress on their health and safety.

The Kore Kooler Rehab Chair can be used for a variety of situations:

Whenever tactical level rehab is required for large-scale incidents, long-duration incidents, and incidents associated with significant temperature extremes

At minimum, following the second cylinder use at an incident while working inside and wearing PPE

- Hazardous Materials incidents
- Training exercises

For more information, go to www.dqeready.com/37C

LEADER introduce the Easy 400 Large Flow Ventilation Fan

LEADER Easy 400 large flow fans are being used to provide effective smoke extraction in large structures, such as parking garages, airports, aircraft on the ground, subways and rail and road tunnels.

Designed and manufactured in France, the Easy 4000 has the renowned fourstroke BMW Flat Twin engine, complete with electronic startup. It gives a powerful airflow of 400,000 m³/hour in the open

Leader's exhaustive testing has proved the effectiveness of the Easy 4000 fans – for example a 3000m³ warehouse was cleared of smoke in just 30 seconds!

Likewise, during the smoke extraction in a 1 km double-track tunnel, the smoke was cleared in 12 minutes bringing sufficient visibility to enable firefighters to enter. The tunnel was completely cleared within 20 minutes.

Furthermore, the Easy 4000 can help to rapidly reduce the concentration of CO and, in the right conditions, can allow operations to continue without the need for breathing apparatus.

For more information, go to www.leader-group.eu





High quality Firew

Austrian PPE manufacturer TEXPORT is increasing its international market presence. After 20 years of successfully equipping fire brigades all over the world, it's now time to introduce one of the market driving manufacturers to new markets.



By equipping 100% of the professional Austrian fire brigades, 30-40% of Germany's professional fire brigades and various numbers of volunteer firefighters, TEXPORT has quickly established itself as a high-quality PPE manufacturer. In recent years, the trend has continued with significant contracts being awarded in various brigades spanning the globe. For the last 20 years TEXPORT has driven the PPE market with its highly innovative and customised solutions.

Experience & Quality

The company's headquarters are situated in Salzburg and run three separate and wholly

owned production sites. Supported by a lengthy dealership network, TEXPORT's registered partners are now able to work with more international customers. Lately, more contracts have

been awarded to TEX-PORT due to the com-

flexibility to pany's customised offer solutions from customer requests. The prototypes of the clothing are developed in Salzburg by an experienced professional design team. In addition to formal and legal regulations, a big focus the company

places on itself is the

ability to deliver products that are not only fit for purpose, but also perform under as many eventualities a fire-fighter may come across, as possible. Each garment is tried by experienced firefighters and put through a series of real life tests to 'iron out the creases'. Only those products which pass



all tests are then established within the portfolio and sent to one of our locations to be produced. Thus, customers can be assured they will only receive product which not only meets, but exceeds all their expectations.

No Sub-Contracting!

Unique in the PPE sector, TEXPORT is able to produce its garments within their wholly owned production sites. The risks associated with subcontracting to third party producers are therefore totally eliminated. The ISO-certified sites are controlled out of Salzburg and consist of fully

trained tailors and machinists who make and check every product produced. For these reasons TEXPORT is able to boast its constant levels of quality and guarantee some of the shortest lead times within the sector.

Patents & Innovations

The company's continued success is also due to their many innovations and patents: With TEXPORT's own material structure named X-TREME®, when used in a firesuit, it surpasses the minimum requirements of the EN469 standard by well over 50% when concentrating on HTI, RHTI and RET. To a firefighter, this means more valuable seconds to retreat from a fire or to save a life and a greater amount of comfort from the highly breathable structure. Also available is TEXPORT's patented X-TREME light® structure. This material structure surpasses the minimum requirements of EN469 and rapidly increases the comfort and breathability due to its lightweight construction. TEXPORT's innovative TRIPLE FABRIC® reflective stripes are a cost saving and fully functional alternative to the reflective tapes commonly used. Being made from flame retardant textiles, it offers 100% breathability and continued visibility over the life of the garment.

The latest innovations were presented in 2013 at the A+A show in Düsseldorf. IB-TEX® TEXPORT offers a premium Nomex® fabric, that sets new standards in both protection as well as asthetics. Highest mechanical values guarantee a never before seen qualityfor PPE outershells. With PBI NEO® TEXPORT also presented the best PBI® based fabric currently available on the market. PBI NEO® unites all familiar advantages of PBI® based fabrics but raises the mechanical values on a new and never before reached level.

Both fabrics were developed with german weaver IBENA® and are exclusively produced for TEXPORT.

It's been a combination of all these factors that have persuaded established brigades like Madrid, Rio de Janerio, Rotterdam, Berlin and Vienna (to name a few) to choose TEXPORT as the preferred product for their firefighters.

With a wealth of technical knowledge, expertise, innovative patented solutions and a growing global market share combined with the history, experience, reputation and IT infrastructure TEXPORT are now ready to take the worldwide fire market to the next level.

New Product Lines – Fire Phoenix and Fire Explorer

The "Fire Explorer" line catches the eye with its technically sophisticated cut and innovative colour combinations previously unseen in firefighting clothing. But the innovation offered in these mod-

For more information, go to www.texport.at

TEXPORT COMPANY PROFILE

ear

els is not just in the way they look. Equipped with a shell made of TEXPORT®'s exclusive IB-TEX® fabric and the X-TREME® material structure, "Fire Explorer" meets the most stringent requirements currently placed on PPE. Highly ergonomic knee and elbow areas, along with the TEXPORT® features mentioned above, produce a conclusive package consistently pushing the cutting edge of technology. The "Fire Explorer" model is available in the three new colour combinations gold/red, navyblue/gold or navyblue/red to match the sporty cut. The Explorer jacket also comes with the TEX-PORT® belt systems, so with a choice of the "Loop System" (tunnel for an optional chest belt), the "Drag System" (belt system for rescue missions) or the "Bear" version with a combination of both systems. The Explorer trousers also accommodate a "Drag System".

An intense period of development and many hundreds of man-hours have delivered a model quite rightly considered peerless on the market today: the brawny and powerful look of the "Fire Phoenix" makes it an instant eye-catcher. But it is far more than just that. Optimisation in the position and usability of all grab straps, pockets and other applications on the suit has continued in line with a thorough revamp in style. Innovative width adjustment on the back of the jacket collar with

single-hand operation wearers to quickly and easily adjust the fit. An additional pocket for the respirator-ID was fitted to the front panel. Moreover, "Fire Phoenix" comes with redesigned radio pocket that easily accommodates an additional, compact digital radio. It goes without saying that "Fire Phoenix" also incorporates all TEXPORT® the features. "Fire Phoenix" also taps into state-of-the-art technology when it comes to safety: on offer with three different belt systems by TEXPORT® (Bear, Loop and Drag system), the suit is in a position to satisfy all of the requirements placed on cutting-edge protective IFF Fire Explorer



Setting the Standard for the Next Generation of Push-to-Talk, Command and Control Technology



or fire fighters working in the harshest of environments, reliable communication is of paramount importance. But, many currently available devices have not been designed for the new generation of digital radios making their way to the marketplace. Audio performance is substandard, end-users environments are becoming more extreme, and the need for the most reliable and rugged communications equipment is more important than ever before.

If your team is responding to an industrial fire in a high-noise environment and audio capabilities are decreased, a programmable device should allow you to push a single button to increase volume, and microphone sensitivity should automatically adjust for better transmission.

What if you had a single product that answered your communication needs and was designed to be scalable and programmable, as well as rugged and durable in extreme conditions? What if you had access to a single product that integrates enhanced superior audio performance in high-noise environments?

Occasionally, you may be in a high-noise environment situation where you may not hear a critical transmission as it is happening and need a visual indication of incoming messages, or you and your partner enter into a low visibility situation due to heavy smoke or lack of proper lighting . . . what if the unthinkable happens and your buddy is trapped? How would you find him?

What if your personal communication device was equipped with an LED indicator light to show the status of your communications and also served as an emergency locator light to find a partner in danger? What if that device also had independent Remote Speaker Microphone (RSM) volume controls separate from radio controls, distinct and easy to locate buttons for RSM activation, automatic micro-



phone sensitivity control, full-duplex capability, and allowed for external RSM audio when a headset is connected letting you keep your crew informed of incoming commands from superiors in the field?

Imagine you are in a situation where you need two hands to control a high-intensity hose and still need to communicate with your colleagues on the ground, wireless Push-To-Talk (PTT) would make this possible. Imagine you are in a victim extraction situation where hands-free communication is essential, when two hands are necessary while climbing ladders, etc. Wouldn't some type of smart PTT communication unit be the ideal solution for your needs? Isn't this the type of product you would want to have in your arsenal of tools while working in these extreme environments?

At Savox Communications we think about your needs in the field of operations and have addressed these and many more concerns from fire fighters and rescue personnel around the globe. We know the working environments of our end-users can change from bad to worse without notice, and they need a product that is reliable and programmable under any conditions. Whether it is extreme cold or heat, high-intensity fire rescues, or low-visibility situations – when communication is critical to the success of your mission, SAVOX Communications is there as a reliable partner.

Our newest line of products will meet the needs of fire and rescue personnel, in the harshest of environments. Our innovative programmable software allows our Next Generation of products to address your communication needs like no other.

For more detailed information on our newest, highly anticipated and innovative communication system, come and see us at the International Wireless Communications Expo (IWCE) from 24th – 27th March in Las Vegas, NV and at the Fire Department Instructors Conference (FDIC) from April 7th – 12th in Indianapolis, IN.

For more information, go to www.savox.com



Celebrate the unsung heroes of the UK Fire and Rescue Service

The Spirit of Fire Awards is one of the most prestigious events in the UK fire and rescue calendar recognising bravery and dedication within the industry

Venue: Park Plaza Westminster, London

Date: Friday 16th May 2014 (7pm onwards)

To book your place and show your support visit:

www.spiritoffireawards.co.uk

Alternatively please contact Rachelle Cornel at rachelle.cornel@vitessemedia.co.uk or Tel. 0207 250 7043



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Proven Ziegler concept on a new chassis

A new Zeigler airport crash tender has recently been delivered to the airport in Croatia.

The official handover of the key to Mr. Roko Toli , head of the Dubrovnik Airport was performed by Till Wasner, Commercial Director of Ziegler.

The special feature of this vehicle is, that this is the first 3-axle airport crash tender on a Titan chassis, which is an excellent addition to the existing vehicle fleet at the airport of Dubrovnik.

The 654 HP V8-cylinder engine of the Z6 accelerates to 80 km/h in less than 35 seconds. On the airstrips this smaller brother of the Ziegler flagship vehicle Z8 reaches a top speed of more than 120 km/h and thus meets the current Euro 5 emission standard.

In manufacturing this vehicle not only the well-proven GRP cab concept was used but also the



high efficiency Ziegler pump technology. The Z6 features a Ziegler fire pump FPN 10-10000, a water tank of 12500 litres and a foam tank of 1700 litres with a proportioner, Ziegler EAD, on the suction side. A roof turret, output 6,000 l/min, a bumper turret with a water/foam output of 2,200 I/min and a powder output of 5 kg/second ensure an efficient fire fighting. With the 250 kg powder extinguishing unit the powder can be discharge via the front turret as well as via the rapid intervention unit.

The well-known CAN-BUS control with large colored identical TFT displays in the driver's cab and on the pump control panels add to the effective and forceful operation of the vehicle.

For more information, go to www.zeiglerfirefighting.com



Book review – 'Beyond the Flames'

David Pike, of Barnstaple, Devon has released his brilliant autobiography called 'Beyond the Flames'.

Ås a teenager at a south London comprehensive school young David Pike was determined not to follow the advice of his careers teacher; factory life wasn't for him. At sixteen he seized the offer of a place as a Junior Fireman with the London Fire Brigade and started a journey that spanned four decades and numerous roles within the Fire Brigade.

BEYOND
THE PLAMES
A tondon firman's story

David book takes the reader 'Beyond the Flames' and details a long and successful career rising through the ranks of the London Fire Brigade. In many amusing anecdotes, he describes the camaraderie and epic fund raising efforts as well as the accounts of devastating fires that sometimes ended in tragedy.

Starting his career as a fire cadet at 16 the author rose to senior rank, always in an operational role. A steady 'plodder' more than a high flier he learnt his trade craft serving, and commanding, the Capital's busiest and most challenging fire station, Brixton. Awarded the Queens Commendation for Brave Conduct he also rowed himself into the Guinness Books of Records whilst raising many thousands of pounds for charity. A talented organiser, he was involved in delivering some of the London Fire Brigade's most high profile public events during the 1990s, including Royal visits and the unveiling of the national Blitz memorial by St Paul's Cathedral. A fireman first and foremost, he provides a valuable human story into the life and history of the London Fire Brigade from 1965 to the late 1990s.

For more information, go to www.austinmacauley.com





FireDos - The Name for Proportioners & Monitors

FireDos is a dynamic, medium-sized German company that has been operating successfully for more than 25 years in the highly specialised field of dosing technology that does not require any external power supply. For the past decade and a half, the company has established an international reputation for its products under the FireDos name. More recently though, it has expanded its offering and today also designs and manufactures a wide range of high-quality firefighting monitors.



hanks to their many advantages, FireDos proportioners quickly gained an enviable reputation and today there are several thousand installed around the world, ready around the clock to safeguard high-risk environments at a moment's notice.

Much of this reputation is founded in the fact that FireDos is responsible for every aspect of its products. Every stage is handled in-house, from design and development, registration and production – including the manufacture of most components – through to sales and customer support service, quality assurance and environment management; all remain under FireDos control.

World Renowned Proportioners

FireDos proportioners are suitable for the proportioning of fluids and work reliably and at a constant proportioning rate without the need for any external energy, even under changing pressure conditions.

The drive is provided entirely by the extinguishing water flow. The water flows through the water motor, which is installed directly in the extinguishing water line. The extinguishing water flow is therefore available entirely for firefighting, without any loss. The number of rotations of the water motor is proportional to the volume flow rate of the extinguishing water.

The water motor and proportioning pump are connected with each other via a coupling, and therefore operate at the same speed. A purely mechanical system, which regulates itself





automatically; the more extinguishing water that flows through the water motor, the more extinguishing agent is added, and vice versa. The proportioning rate is elected by the user and always remains constant.

New Firefighting Monitors

Last year, FireDos took a major step in the company's development and after extensive research and development added a new generation of fire-fighting monitors to its product range. Not that monitor technology was new to the company, as key personnel in the company have more than 100 years' experience in monitor design, development, manufacture, distribution and service. As FireDos customers expect, the new monitors share the same pedigree as the company's proportioners; they are robustly engineered, with high-end technical performance characteristics.

The new range will ultimately comprise the M2 (up to 2500 litres/minute), the M3 (up to 4000 litres/minute), the M4 (up to 6000 litres/minute), the M5 (up to 10000 litres/minute), the M7 (up to 20000 litres/minute), and the M12 (up to 50000 litres/minute). The first of these to be introduced was the M4 with a volumetric flow rate of water of up to 6000 litres/minute. All FireDos monitors feature the ground-breaking "oval flat design" and are suitable for water, foam or powder output, can be supplied in aluminium or bronze alloys, with manual or electrical actuation (direct or alternating current).

For more information, go to www.firedos.com

PBI continues development of outershell fabrics

Since their introduction 30 years ago, PBI fabrics have become renowned for their unique combination of flame resistance, durability and comfort, which is why they are first choice in protection for the most extreme conditions, from NASA's astronauts, to emergency responders, the military and formula one drivers.

A number of new PBI fabrics that have recently been added to the ever growing range of PBI outershells. PBI Max, Gemini XTL and Ibena Neo recently joined the company's family of high performance protective fabrics, complementing the internationally renowned PBI Matrix and PBI Gold fabrics.

PBI fabrics offer firefighters the combination of thermal protection that will not break open along with high levels of comfort, flexibility, and durability. They deliver good abrasion resistance and excellent tensile strength. PBI's thermal protection from exposure to heat and flame has been proven over many years of independent testing and performance in the field.

The outer fabric is the first line of defence in any protective clothing



ensemble and has to be strong and durable to cope with the impacts and abrasions that come with the job. It doesn't matter how well a fabric protects the wearer if it won't hold up to the working environment. PBI fabrics are very durable with high tear and UV resistance. Many customers who have chosen PBI fabrics have noted that structural PPE remains in better condition and requires less maintenance than previous ensembles, potentially extending

the lifetime of PPE without compromising on protection. Of course, high durability also means low maintenance.

PBI Gold was the first fabric developed by the company that was specifically designed to protect firefighters and was instantly recognisable due to its distinctive golden colour. Today, PBI fabrics are also available in navy blue or black, offering a wider choice to fire services.

lan Callaghan, Director, International Sales and Marketing, PBI Performance Products said: "In the last 30 years PBI has become a global leader for protection in extreme environments because our customers recognise the truly high performance standards that our products achieve. We have always let the products speak for themselves and we give customers the chance to visit independent tests of our fabrics so that they can see an impartial comparison of the combination of protection, durability and comfort that make PBI fabrics unique."

For more information, go to www.pbiproducts.com

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www.firedos.com

Australia's Largest Fire Brigade Chooses SOLBERG

The Solberg Company, a global supplier of firefighting foam concentrates and systems hardware have been awarded a multi-year contract by the New South Wales (NSW) Government for supply of firefighting foam.

Solberg Asia Pacific Pty Ltd. was awarded a three year contact for the supply of RE-HEALING RF3x6 ATCTM Class B and FIRE-BRAKE Class A foam concentrates for use by both the New South Wales Rural Fire Service (NSW RFS) and Fire and Rescue NSW (previously known as New South Wales Fire Brigades). Additionally, included under this contract are NSW National Parks and Wildlife Services, Forestry Corporation of NSW, other State related agencies, plus member agencies of the Australasian Fire Authorities Council.

RE-HEALING RF3x6 ATC is a high performance fluorochemical free foam concentrate that easily extinguishes hydrocarbon (petrol) and polar solvent (ethanol) fuel fires. RE-HEALING foam concentrates can also be used to prevent re-ignition of a liquid spill and control hazardous vapours. Fire and Rescue NSW, and NSW Rural Fire Service will no longer use AFFF, FFFP or other fluorochemical based foams that are environmentally persistent with their transition in firefighting foam technology.

FIRE-BRAKE Class A foam, achieved fame in the 1994 in assisting NSW firefighters in successfully extinguishing the largest wildfires to ever surround Sydney. By making water up to ten times more effective the product was later recognized as one of The Top 100 Australian Inventions and Innovations of the Last Century by the Sydney Powerhouse Museum and the Australian Academy of Technological Sciences and Engineering.

The New South Wales Rural Fire Service (NSW RFS) is a volunteer-based firefighting agency and statutory body of the NSW Government. The NSW RFS is responsible for the general administration of rural fire management affairs including administration of the Rural Fire Fighting Fund, coordination with local government of the State's Rural Fire Brigades, design and provision of firefighting equipment to rural fire brigades through local government, the training of volunteer Rural Fire Brigade members, community education in relation to fire affairs, emergency planning and generally taking measures for the prevention of loss and life and property from fires.

The NSW Rural Fire Service's jurisdiction



covers more than 90% of the geographical area of the state of New South Wales in Australia. The NSW RFS is one of the world's largest volunteer fire service, with 70,246 volunteer members forming 2,036 volunteer brigades across the state.

Fire and Rescue NSW, also an agency of the government of New South Wales, is responsible for firefighting, rescue and hazmat services in the major cities, metropolitan areas and towns across rural and regional New South Wales. Fire and Rescue NSW is the seventh largest urban fire service in the world, with over 6,800 firefighters serving at 339 fire stations throughout the state, 408 support staff, and 6,000 community fire unit volunteers.

NSW Rural Fire Service and Fire & Rescue NSW join Queensland Fire and Rescue Service, Queensland Rural Fire Service, the Australian Capital Territory (ACT)
Emergency Services Agency, the Melbourne
Metropolitan Fire Brigade, The Northern
Territory Police, Fire and Emergency
Services and Bushfires NT (Northern
Territory) as converted believers in proven
fluorochemical free firefighting foam
technology from The Solberg Company.

For more information, go to www.solbergfoam.com



FLIR extends trade-in program for K-Series firefighting camera

FLIR Systems has announced that the company is extending its special trade-in program that allows fire and rescue services to receive an even better deal on the purchase of a new FLIR K-Series thermal imaging camera. This is possible by trading in and sending in any other qualifying make or model of firefighting thermal imaging camera.

The program began earlier in 2013 when FLIR launched its new K-Series firefighting thermal imaging camera line. The program, which was due to expire at the end of 2013 will now remain in effect until the end of June 2014.

The extended trade-in program includes a discount of 200 euros off the list price of the K40 and 400 euros off the price of a new K50. To qualify for this discount, fire departments need to trade in and send in their existing firefighting thermal imaging camera to the local FLIR distributor, regardless of the camera's age, make, or model and regardless of whether the camera is working or not.

For more information, go to www.flir.com



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New fire hazards merit new responses

As industrial activities and urban landscapes evolve to become more complex, fire fighting technology must constantly innovate to deal with new fire threats posed by built up areas, manufacturing environments and high rise towers. How is the industry responding?



odern cities and industrial activities are creating complex environments, leading to the possibility of dangerous fires that are difficult to reach or subdue. Fire fighting has been forced to look beyond current methods to effectively knock down difficult fires.

The One Seven Group is dealing with emergent fire situations by innovating in the field of Compressed Air Foam (CAF) systems to offer its One Seven solution. The development of One Seven technology started in the mid 1990's with mobile systems,

with fixed installations available since 2002.

At the heart of One Seven is a particularly effective extinguishing foam. The One Seven foam generator transforms each drop of water into seven foam bubbles by adding foam concentrate and compressed air. This creates a foam blanket that sticks to all surfaces in the fire scene.

This adhesive property has multiple fire suppression effects. The foam covers the surface of the solid or liquid fuel, stopping the release of flammable gases thus stopping the incineration immediately. The adhesive foam vaporizes on the fuel to bring its temperature below the flash point and shields the heat release form the hot surfaces into the fire scene. In addition it shields un-ignited fuel from the fire's heat radiation and prevents its ignition.

The basic premise to create a solution that is effective enough to achieve rapid-fire knockdown that in turn drastically lowers property damage.

Water usage is also a consideration, both in terms of property damage and environmental impact. One Seven's reduced water usage prevents water damage and facilitates clean up. The technology allows up to 90% utilisation of the water discharged on the fire scene, compared to a mere 5-10% with conventional fire fighting methods.

Beside the superior efficiency One Seven provides added safety for the fire crews especially in dangerous interior structural attacks. CAF technology's effectiveness was formally recognised by NFPA in 2006. CAF is now part of the NFPA 11 standard, where it forms a separate category besides the conventional low, medium and high expansion foams.

One Seven's fire fighting efficiency and universal applicability has seen it sold to over 1,500 fire departments worldwide. Numerous fixed installations have been implemented to date – mostly in industrial applications. One Seven's CAF technology has been proven to effectively combat dangerous fires even in difficult locations, such as tunnels.



One Seven has condensed and integrated its technology into effective mobile solutions for fire crews. The Group has created mobile systems that combine centrifugal pump, foam proportioner, compressor and foam generator with automatic regulation technology. The system ensures the consistent and replicable production of extinguishing foam without needing manual adjustments.

The Group says that its mobile solutions put fire fighter safety front and centre through technological advances that include a simple one-button operation, safe attack distance due to a throwing range of up to 80 metres, and lightweight equipment resulting in easier mobility. The specific properties of the One Seven extinguishing foam also result in rapid cooling of fire scenes, better sight due to reduced smoke, reduced risk of re-ignition due to the foam's cooling blanket, and safe operation in electrical plants.

One Seven falls under Gimaex, an international group that focuses on the development and production of vehicles, systems, equipment and devices for fire fighting, aerial and technical rescue, environmental protection and communication.

Gimaex has been fighting fires since 1934, and is one of the oldest manufacturers of vehicles and equipment in the field. It has a network of bases across Europe, with each location adding unique competences to its overall offering. This gives Gimaex the resources to engage in innovation. Gimaex employees are also heavily involved in voluntary fire brigades and rescue units, which lets the Group draw on first hand expertise and insight in creating new technology.

One Seven is an excellent application of CAF technology, which provides fire response units new means to tackle dangerous blazes. As living spaces and industrial activity give rise to new threats, fire fighting technology is finding ways to keep pace.

For more information, go to www.oneseven.com

Draeger Safety UK supports young firefighters

A leading Northumberland safety manufacturer has announced the support of an exciting initiative with Northumberland Fire and Rescue Service's Young Firefighters' Association.

Sponsorship money provided by Blyth based Draeger Safety UK, is being used to help support the scheme which is open to 13-17 year olds, giving them the opportunity to work towards a Level 2 BTEC qualification in Fire and Rescue Services in the Community.

As part of the initiative, a group of over 80 dedicated young people have this summer taken part in a unique team building camp, designed to bring together members from across the 10 different branches in Northumberland. After an intense year of training and working hard toward their qualifications, the weekend at Whithaugh Park in the Scottish Borders,



gives young firefighters the opportunity to enjoy some well-deserved time away, taking part in team building activities, outdoor pursuits and games.

Alan Middleton, from Northumberland Fire and Rescue Service's Community Safety Academy and who was himself once part of the Young Firefighters' Association, commented:

'Northumberland Fire and Rescue Service is delighted to be working with Draeger Safety UK to support the Young Firefighters' initiative.

Across the year, Dräger sponsorship money has been used to support a number of different activities for the youngsters involved in the scheme, including this year's summer camp and the recent Drill competition.

The Young Firefighters' Association is all about

supporting our next generation, helping to reduce anti-social behavior and equipping young people with the skills they need to embark on their future careers. It also gives us a unique opportunity to teach young people important safety messages, which they can pass on to their family and friends.

It is only through support and financial backing from companies such as Draeger that we are able to continually offer these young people the opportunities to take part in such a wide range of different things.'

The Young Firefighters' scheme is open to all young people in Northumberland, where they participate in a number of different activities from leadership skills, to firefighting skills and projects within the community – all of which contributes towards the qualification they receive upon completion.

Phil Saxton, Sales and Marketing Director from Draeger Safety UK, said: 'At Draeger Safety UK, it is important to us to help support community initiatives such as the Young Firefighters' Association and we are very proud to be involved in this scheme with Northumberland Fire and Rescue Service.

The scheme teaches young people invaluable life lessons whilst at the same time, provides a stepping stone to their future careers and it is very rewarding to feel that we have made a contribution towards this. It's vital that we equip our next generation with the skills they need to go out into the community and help make Northumberland a safer place.'

Alan Middleton continued: 'We are always on the lookout for new members to join the Young Firefighters' Association. It offers a fantastic way of building up self-confidence and communication skills as well as teaching young people the ways in which they can help to make their community safer.

I was once part of the association myself – the experience I gained gave me a great stepping stone towards my future career as a fire fighter and I would wholly recommend it."

For more information, go to www.northumberland.gov.uk

Fhoss launch new range of PPE

Fhoss Technology, a leading supplier in Personal Protective Equipment (PPE) have announced the launch of its full range of high visibility garments for emergency services personnel.

Based in Weston-super-Mare, UK the company has designed, manufactured and patented the next generation in PPE, which lights up even in areas of total darkness.

Unlike standard PPE, which only works by reflecting off an additional light source, Fhoss works through the presence of a battery operated electroluminescent core, which actively emits light. This means that the tape illuminates even when no ambient light is available.

Fhoss, which takes its name from the Greek saying, 'Where there is light, there is life', was the brainchild of company CEO Andy Kimitri who saw a need to progress the standard PPE which has remained unchanged for over 50 years.

Andy comments: "Safety sits at the forefront of our agenda. While traditional PPE works well with the presence of ambient light, it is of no use in darkness or in bad weather conditions. Fhoss represents a big step forward in the PPE market as a whole, as it means that emergency services workers can be seen at all times and in all conditions. By introducing Fhoss to the PPE arena, we pledge to help bring about a change in culture for the way in which the emergency services protect their staff. We believe strongly that our technology has the capability to save lives."

"With nights closing in and the news that some councils are turning off lights in urban areas throughout the night, unfortunately there is generally less ambient light present on Britain's road. By spreading the word of Fhoss, we hope that more people will be seen and, as a result, fewer accidents will occur."

Fhoss equipment, which is made in the UK and the Far East, is compliant with all PPE industry regulations (including EN471 and GO/RT3279) and is fully recyclable.

The garments are certified for over 25 washes, will operate for up to 20,000 hours and can be charged over 500 times.

For more information, go to www.fhoss.com

Innovative design and engineering

Quiroga Trucks is a family company engaged in the manufacture and sale of emergency vehicles. The company has thirty four years experience of developing emergency vehicles and their innovative design and engineering concepts allow them to manufacture emergency vehicles according to customers' specifications therefore helping them procure the right emergency vehicle that meets their needs.



uirogo strive to help customers through the process of evaluating their exact emergency vehicle needs and guiding them through the design procedure, and help them acquire the vehicle that best meets their unique requirements.

The company has a very broad product line; Initial Attack Vehicles, Commercial amd Custom Pumpers and Aerials, Industrial Pumpers, Tankers, Wildland, Rescue, Ambulances, Special Service Support Vehicles, and Aircraft Rescue and Firefighting (ARFF) vehicles of all sizes.

The company's production facility now exceeds 90,000 square feet and includes a UL pump test site, a 'tilt table' for NFPA testing, and is presently expanding facilities for ARFF vehicle testing. A new



USA division, the 'Qualified Fire Tech' based in McAllen, Texas has been established to support growing operations, purchasing, and service coordination.

The growth of Quiroga Trucks has been slow and steady; nevertheless, with a solid understand-





ing of firefighting and engineering depth, excellent fire apparatus and ambulances are being produced. Quiroga proudly shows ambulances and fire apparatus at the Fire Department Instructors Conference in Indianapolis, USA each year and has expanded sales on a worldwide basis.

In recent years, Quiroga's quality far exceeds customer expectations through continuous improvement in manufacturing processes and equipment, introduction of new innovative materials and suppliers. The 'heart' of these quality improvements has been guided by meeting the relevant NFPA standards and the company's experience.

It is truly exciting times at Quiroga Trucks; with plant expansions, new people, new manufacturing equipment, increased sales, and with a solid 'family team' – the future is certainly bright!

The Quiroga mission is to satisfy the requirements of our customers by manufacturing reliable, high-performance products and ensuring constant ongoing improvement, thus contributing to the safety and efficiency of the firefighters.



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For more information, go to www.quirogatrucks.com

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fire apparatus & ambulances







BRISTOL UNIFORMS COMPANY PROFILE

Philip Tasker



PPE Pedigree driv

With a history of clothing design and manufacture stretching back over 200 years, of which the last 70 have seen an increasing focus on personal protective clothing, Bristol Uniforms, with its recognisable Bristol brand, has built an enviable global reputation as a manufacturer of innovative and world class PPE.

Ithough the first UK specifications for fire fighter clothing were only introduced in the early 1980s it was some 40 years earlier that Bristol had become involved in the design of fire protective suits for air force pilots during the Second World War. In the 1960s, flame protective suits made from aluminised fabrics were developed for firefighters at RAF airfields. Although rudimentary by 21st century standards, the experience gained in these early, pioneering, days was to prove valuable in the later 1960s and 1970s when the first man made fibre alternatives to wool were introduced by DuPont in the form of the original flame retardant Nomex® fabrics. For the first time manufacturers had access to a fabric which combined both flame and water protection and had inherent strength and resistance to physical damage.

During the early years of Nomex® firefighter tunics, leg protection continued to be met by the use of PVC coated fabric trousers, known as PVC wetlegs, which were chosen for their superior water resistance. However, their major weakness, their flammability, was seriously exposed in the major London Underground disaster in 1987 when many people and firefighters died in a major fire at the capital's Kings Cross station in which the PVC wetlegs were found to have contributed to the death toll amongst firefighters. The first Home Office specification for firefighter PPE, the A26, was developed in collaboration with Bristol and became the first national standard in 1988. The first European Standard, EN469:1995, was developed from a working group set up in 1992 with the BSI representing the UK with Bristol's technical input.

Bristol has continued to play a significant role in the development of European firefighter PPE standards in the intervening 20 years which will see the latest EN469 standard published later in 2014. Bristol continues to provide technical input to the development of new standards through its representation on working groups. More recently this work has broadened out to include technical rescue garments as well as structural firefighter PPF

During the last two decades, the scope for product performance improvements has been the result of ever closer global collaboration between fibre, fabric and PPE manufacturers. The development of new fibres and fabrics by PBI, DuPont and Kermel, and the use of new fibres from these manufacturers for the development of new specialised fabrics by leading international weavers such as Hainsworth, has allowed Bristol to design firefighter clothing which not only provides enhanced personal protection but has led to the introduction of new generations of more ergonomically efficient clothing. Ten years ago,



Bristol pioneered the use of physiological assessments through wearer trials to determine the impact of firefighter PPE on both the ease of movement and the stress levels of internally generated heat during active deployment. This was the first time that the overall health and safety of firefighters had been researched by looking closely at internal factors. The results clearly showed that

24

es Innovation

the weight and construction of firefighter clothing were significant factors in the physiological responses of firefighters. This led to the introduction of lighter weight 3 layer PPE constructions as well as the development of a unique three dimensional design, Bristol's XFlexTM, which offers enhanced levels of wearer comfort and mobility and which has become the platform on which the latest structural and technical rescue protective garments have been designed and built.

At a time when a number of specialist PPE manufacturers are turning to diversification as a route to expanding their businesses, Bristol has adopted a strategy of increased focus and specialisation. This approach has been part of a long term plan to intensify its concentration on developing ever higher performance protective clothing for the emergency services – a plan which began back in the 1980s when the company ended its production of workwear. The successful pursuit of this strategy has been dependent upon an ongoing investment programme in research and development, design capability, state-of-the-art manufacturing capacity in the UK and a long term commitment to bespoke product offerings.

To achieve its growth and market share objectives, Bristol has steadily refocused its attention on putting collaboration at the heart of its business model. This collaborative approach is actively used in both its upstream and downstream relationships. Mention has already been made of the partnerships which have been built with major materials suppliers which has created a close and confidential commercial environment which, in turn, has allowed an extensive sharing of information for





shared technical programmes. Similar relationships with specialist IT suppliers and production equipment manufacturers has been behind the successful enlargement of its UK production capability by the expansion of computerised design, production planning and production control.

Given the increasingly technical nature of protective clothing for firefighters, riot police and technical rescue and hazardous area response teams in the ambulance and air ambulance services, focusing on the design and development of multi-layered protective garments has produced results which have cross-over benefits for all emergency services personnel. The range of physical properties which need to be incorporated into the variety of two and three-layered garments which meet the various national, European, North American and International standards is extensive and requires the level of specialisation which is made possible by concentrating on emergency services PPE. These characteristics include flame and water protection, breathability, pathogen and hydrocarbon resistance, tear, puncture and

BRISTOL UNIFORMS COMPANY PROFILE



abrasion resistance coupled with the ability to deliver good wear resistance and to withstand regular maintenance. Minimising the lifetime cost of ownership of high performance technical clothing relies considerably on its longevity which, in turn, requires build quality to allow frequent washing and decontamination (where required) without impairing the integrity and performance of the garments involved.

Whilst efficient systems and manufacturing are a key to the production of world class products, capable of meeting the technical and commercial needs of customers in well over 100 countries where Bristol's products are in regular use by municipal and industrial firefighters and civil defence forces, resilience of the business is key to providing long term confidence to customers. Its importance in creating and maintaining long term supply contracts, as demonstrated when securing the contract for the Integrated Clothing Project (ICP) for the fire and rescue services in England and Wales in 2008 and which runs until 2021, has been illustrated on numerous occasions when continuity of supply and support services has ensured that the operational capability of fire and rescue services has not been compromised. Resilience is closely tied into business continuity on

which fire and rescue services and the public they serve and protect depend. Financial strength provides the resources needed to weather the inevitable fluctuations in business activity which arise from the impact of business cycles on nations' economies and the ability to meet the investment demands of an expanding business. The other major constituent of resilience is the ability to maintain product availability and support services even in the face of unforeseen events. Bristol has, over time, located additional manufacturing capacity away from its Bristol base to other locations in the UK and elsewhere in Europe. In this way it has ensured that the levels of product quality essential to supporting its brand values are readily monitored and maintained, that the supply chain remains strong and that these locations can be effectively and efficiently managed.

Resilience can also be measured in terms of the level of control the company has over its supply capabilities across the range of head-to-toe PPE it supplies. In recent years, Bristol has invested in the development of its own brand of garments in addition to those traditionally associated with the company – fire coats and trousers. In 2012, for example, two new in-house manufactured flash hoods were introduced and further extensions of this product policy will see a new range of firefighter gloves launched in 2014 with other items of PPE likely to follow in future years.

Over 160 years ago, Bristol was regularly shipping ready-to-wear men's clothing to Australia, an extension of its export business which dates back to the 1830s. It was a major milestone of some historical significance when, in 2009, Australia once again became a growth market – this time in firefighter PPE. The appointment of PAC Fire Australia as Bristol's distributor there provided the springboard it needed to re-enter the market which has seen both Airservices Australia's ARFF and the Australian Defence Force's firefighters specify Bristol PPE which was delivered and deployed in early 2010 and 2012 respectively.

Business with municipal fire services and industrial users, built up over the past 40 years, is now handled by over 70 distributors covering over 100 countries on every continent. Around half of all Bristol's PPE is shipped into export markets every year, a business which continues to grow steadily. Whilst Europe, considered by some to be a 'home' market as many of the countries are now an integral part of the European Union, is an important destination for Bristol's EN classified fire clothing, its NFPA standard PPE is used in parts of South America and the Gulf States. Many smaller nations prefer either to adopt EN or ISO standards whilst some large countries have developed their own standards based on derivations of either EN or ISO standards such as the Australian AS4967 standard to which the ARFF kit for Airservices was made.

Bristol will continue to use its technical, manufacturing and managed services skills and experience to reinforce its brand values and its global reputation as an innovative, reliable and supportive supplier. A valued pedigree is a mark of past performance and, in a complex and highly competitive world market, the company will be working hard to demonstrate to its customers, suppliers and prospective future users that it is capable of matching their expectations well into the future.

Philip Tasker is UK Sales Manager with Bristol Uniforms

For more information, go to www.bristoluniforms.com

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IFTC invests £200K in new Advanced Disaster Management Simulator

The International Fire Training Centre (IFTC), one of the world's leading fire training centres based at Durham Tees Valley airport, has invested £200,000 in a state-of-the-art Advanced Disaster Management Simulator (ADMS).

The Command and Control system is designed for use by airports, industrial centres and port authorities and provides a realistic, interactive and dynamic virtual reality simulator with built-in artificial intelligence and physics-based effects.

ADMS bridges the gap between classroom and live exercises and enables delegates to gain necessary insight and skills to handle any type of fire emergency. High-fidelity simulation of the incident situation and emergency response services gives a real world feel and is an effective way to put teams through their paces and



Less than three months until Hazmat 2014

The National Chemical Emergency Centre's (NCEC) two-day Hazmat conference takes place on 30th April and 1st May at Eastwood Hall, Nottingham, UK. Hazmat 2014 is organised by NCEC, with support from Tactical Hazmat (www.tacticalhazmat.com).



This annual event has been successfully running since 2007 and provides a perfect opportunity to keep up to date with hazardous materials response, chemical exposure and monitoring, emergency planning, developments in legislation, future technologies and to learn lessons and share experiences with peers.

The packed programme has recently been awarded ten hours of continuing professional development (CPD) by the Institution of Fire Engineers (IFE members qualify for a 5% discount on the delegate rates) and gives delegates a choice of workshops and presentations that will appeal to a broad cross section of the emergency services and aims to encourage multi-agency working.

Presentation topics for 2014 include:

- Safe, unsafe and dangerous a practical approach to handling hazardous materials
 Amateur pyrotechnics and utilisation of detection, identification and monitoring (DIM) response
- Joint Emergency Services Interoperability Programme (JESIP) concept, aim, background and practical application
 Exercise Arden (a multi-agency chemical, biological, radiological, nuclear or explosives (CBRNe) scenario testing human factors)
- Evidence base behind shelter and evacuation decisions in chemical and radiological incidents involving biological agents
- Security of hazmat' Scale up, scale down'
- Chemsafe Case studies

The programme for Hazmat 2014 will feature four interactive workshops and scenario sessions, each running twice during the course of the event to give delegates the opportunity to attend two sessions from the four available. The workshops will cover forensics in hazmat incidents, practical deployment of DIM equipment, hands-on illicit drugs laboratories and a table-top scenario exercise.

Our twenty five speakers include Mike Callan, a renowned independent safety trainer from the USA, Leon Brain from the UK Department for Transport, Chris Case from Merseyside Fire and Rescue Service, Mark Rogers from the Met Office and Mike Dale from National Resilience.

teach, assess, practice and rehearse various organisational roles in incident management.

The cutting-edge technology allows users to operate and train in multiple concurrent scenarios and is particularly suited to training exercises where situations escalate and require several levels of command and control, such as an aircraft landing with a severely overheated undercarriage. The scenario would then evolve into an ignition of the undercarriage system and wheel assembly whilst passengers disembark the aircraft. The incident would further deteriorate into a fully involved aircraft accident with external and internal fire situations, this would then require sectorisation and a greater level of control from the Incident Commander. The arrival of various external emergency services will necessitate resource management and the eventual handing over of the command role. IFTC, which is owned by international service company Serco, is already a market leader in the provision of aviation fire training and the new investment will complement its Serco Public extensively-equipped fire ground at Durham Tees Valley airport that attracts delegates from around the world.

Dennis Perkins, IFTC's Director of Training commented, "Our clients in the fire and rescue sector are the ones on the front line so they know that training should never be about ticking boxes. IFTC is known to have one of the best fire grounds of its kind anywhere in the world. By investing in the new ADMS system, we now have the versatile and relevant technology to provide a whole new dimension to the learning they will get here."

For more information, go to www.iftcentre.com

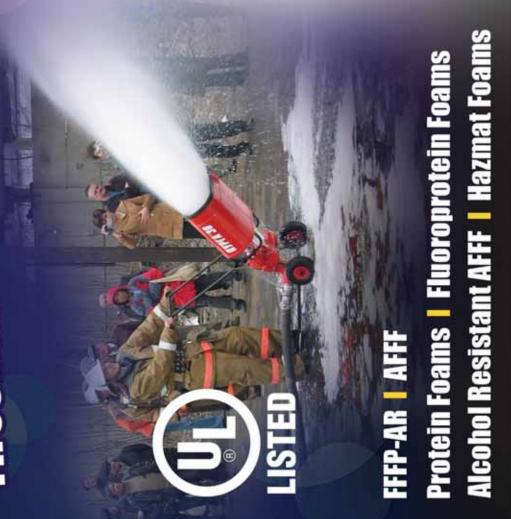


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Urban Search and Rescue Capability



Dan Stephens

The Urban Search and Rescue (USAR) capability for England and Wales was introduced through the New Dimension programme in 2004 in response to the terrorist attacks which took place in the USA on 11th September 2001. This programme has now transitioned into the National Resilience capabilities managed on behalf of Government by the Chief Fire Officers Association (CFOA)

ire and Rescue Services (FRS) in England and Wales have a statutory duty to respond to incidents involving collapsed structures and heavy transport incidents.

Article 3 of the Fire and Rescue Services (Emergencies) Order 2007 requires the FRS to make provision for rescuing people and protecting them from serious harm in the event of:

- a An emergency involving the collapse of a building or other structure (not including a tunnel or mine) and
- **b** An emergency involving a train, tram or aircraft which is likely to require a FRS to use its resources beyond the scope of its day to day operations (e.g. a serious transport incident).

Seventeen FRS in England have been provided

with USAR assets and funding to support a team of thirty USAR personnel including a canine and handler. Sixteen of the FRS host one team and the seventeenth, London, host four teams, giving a capability of twenty teams. The teams are located to ensure an even geographical spread across the Country. A further USAR team is hosted in Wales, with Scotland and Northern Ireland having a similar capability.

The capability has been operationally available in its entirety since March 2008 and during that time has responded to over 1,100 incidents around the country.

Each USAR team consists of a minimum of thirty personnel (including a canine handler). A typical USAR response consists of ten technicians –

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USAR



one of which would be a designated team leader or officer in charge (OIC); as well as a search and rescue canine – trained to locate live casualties.

Each technician is trained in core USAR competencies which include technical search, scene and structural assessment, breaching and breaking, lifting and moving, working at height and confined space. In addition, individuals within each team have specialist skills which include chainsaw and hot cutting. Technicians are also trained in Line Access and Casualty Extrication (LACE), which enhances the capability while operating in confined spaces and working at height.

Fire Service Circular 08/2008 provides a concept of operations for USAR, detailing how the capability responds and is deployed to different levels or scale of incident. This ranges from remote advice to a full deployment of multiple teams to three simultaneous incidents. When a team responds they can mobilise with three prime mover vehicles which carry any one of five demountable modules which are provided to each team. The nature and scale of the incident will dictate which configuration of modules are mobilised. The USAR concept of operations provides structured criteria at national level to ensure that an adequate provision of all modules is provided by multiple USAR teams in the event of a national scale (level 4) incident.

Each of the five modules contains a range of equipment that would facilitate the successful undertaking of search and rescue operations and varies from structural assessment and technical search equipment (module 1); heavy transport, confined space and hot cutting (module 2) and heavy breaching and breaking equipment (module 3). A multi-purpose 'bobcat' vehicle is transported on module 4 which provides a safe system of work when unloading equipment from the other modules as well as providing a rubble clearance and fork lift capability; whilst module 5 contains approximately five tonnes of timber and nails that is utilised for shoring operations.

The responding teams of USAR technicians are supported at incidents by a Tactical Advisor (TacAd). These highly trained personnel can be utilised on a day to day basis, however, they also provide a vital role within the National Coordination and Advisory Framework (NCAF), which is in place for national level incidents. The TacAd has a specific role of liaising with the FRS incident commander and providing advice and guidance as to how and where a USAR team can be deployed. The TacAd also acts as a conduit for liaising with other agencies on scene. One such example involved a USAR TacAd working in conjunction with local authority building engineers and the Health and Safety Executive (HSE) in producing a detailed lifting plan which resulted in the successful removal of a crane jib that had collapsed on to an apartment block in Liverpool, UK.

Other high profile incidents, where USAR TacAds and the USAR capability has demonstrated its value, include a mine collapse at the Gleision Colliery in Wales which has resulted in a Memorandum of Understanding (MoU) being produced between the Mines Rescue Service and the National USAR capability to ensure an integrated response to incidents of this nature; as well as the Atherstone-on-Stour incident in 2007 which tragically resulted in the deaths of four firefighters. The USAR capability is held in high regard across the rescue sector and similar MoUs are in place with the British Transport Police and the Police Disaster Victim Identification (DVI) teams.

CFOA provides operational assurance of the capability to the Government. This is achieved through the CFOA governance arrangements. The USAR capability sits within the strategic area of National Resilience which forms an element of the CFOA Operations Directorate.

The USAR National Working Group (NWG) is chaired by the CFOA USAR Capability Lead Officer. Each of the nine English regions is represented at the NWG along with representatives from Wales, Scotland and Northern Ireland. The NWG sets the strategic direction for the Capability and agrees a business plan each year which contains a number of actions to achieve the required strategic outcomes.

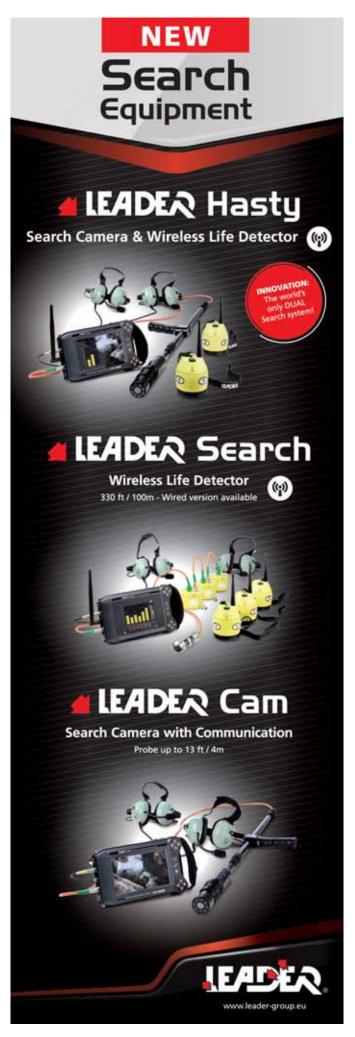
The National User Group (NUG) is chaired by the National Resilience Assurance Team (NRAT) Capability Officer for USAR. The NUG is the tactical delivery arm of the NWG and is attended by representatives of each USAR Team.

The USAR Training Sub Group supports and reports to the NUG in relation to all training related matters. Each USAR discipline has a technical lead appointed who works with the Training Sub Group to develop risk assessments, operational procedures and training packages.

The USAR Maintenance of Skills Framework has been developed by the Capability and is utilised by each Team to ensure that the required levels of competence are maintained. This is tested through an assurance process undertaken once every three years by the NRAT and through continual evaluation of incident and exercise outcomes.

To build on the skill acquisition courses and the maintenance of skills framework, there is a







continuous professional development programme that is fully supported and implemented by teams within the regions. However, in October 2012 the capability took advantage of an outstanding opportunity to attend a Master class in the USA. Building on an existing relationship with the Charlotte Fire Department and the North Carolina Emergency Management Service; borne out of work over the last six years by the CFOA Water Rescue Group during tactical and strategic level water rescue classes; enabled the development of a program specifically designed for USAR technicians and TacAds. Consequently, a UK delegation was able to attend a programme of training in North Carolina. The delegates included USAR technicians from Merseyside, West Midlands, Buckinghamshire FRSs and London Fire Brigade; as well as TacAd and strategic managers representing the majority of the USAR asset hosting FRSs across England, Wales and Northern Ireland.

The training consisted of classroom based sessions which delivered input on areas such as:

- Operational logistics
- GPS and mapping
- National Incident Management System (NIMS)
- Trauma and casualty care
- Disaster management and planning
- USAR command management and leadership

In addition, course delegates were required to deploy to a simulated devastated area, where they had to erect and manage a Base of Operations (BoO) as part of a three day field exercise. USAR assets were provided by the North Carolina USAR

Task Force 3; with course input being delivered by highly knowledgeable and experienced officers from the Charlotte USAR Task Force, Fire Department of New York (FDNY), the FEMA registered USAR Task Force 2 in Florida, the Oklahoma Fire Department and the North Carolina Emergency Management Service.

As mentioned earlier there have been a number of high profile incidents, since the inception of the USAR capability, including the London bombings in July 2007, where personnel from the USAR capability were deployed and contributed to the resolution of the incidents. However and fortunately, there have not been any national level incidents. Therefore to ensure and test the readiness of the capability there has been a number of large scale and challenging exercises. Exercise Orion was a large scale and unrehearsed exercise that took place in September 2010. The rationale was to test the European Union Civil Protection mechanism and mutual support to member states. The scenario was a large earthquake, which caused severe damage to infrastructure, widespread death and injury with numerous casualties trapped at locations across England, Liverpool being one such location. More recently in April 2013, three

simultaneous large scale exercises were conducted. Exercise Roaring Lion in Merseyside, Madison in Lincolnshire and Endeavour in Tyne and Wear provided a robust test of the concept of operations, with the outcomes being fed into the evaluation process. Numerous other exercises have also taken place and many more are planned for the future that will see USAR continually tested and developed.

One development has seen many of the FRS who host a USAR team incorporating the assets into their routine operational response. This has resulted in USAR personnel and equipment now being deployed as part of the pre-determined attendance at incidents including road traffic collisions (RTC) and rope rescue in several FRS around the country.

The USAR capability over the last five years has continued to develop and evolve and go from strength to strength, building relationships across the globe as well as in the UK. The capability has demonstrated how valuable it is, not just where there are collapsed structures or large scale transport type incidents, which it of course excels at, but at a range of other incidents, such as the Gleision colliery, where the skills of the technicians and the specialist equipment that they have at their disposal has been instrumental in bringing these difficult incidents to satisfactory conclusions. The testing, exercising and development of the capability will continue in the future to ensure that USAR continues to provide value and is ready to respond wherever and whenever it is required. IFF

Dan Stephens is the Chief Fire Officer with Merseyside Fire and Rescue Service, UK and is the Urban Search and Rescue capability lead officer for the Chief Fire Officers Association.

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Ari Drougas

As a firefighter or an emergency rescue professional, you are only assured of one thing: you never knowing what's coming next. Supreme adaptability in your training is required to be prepared for the myriad situations you will be expected to deal with in the course of a single year, let alone a lifetime in these challenging but rewarding careers. There is, however, one thing that doesn't change with regard to your plan of action in any given situation, and that is establishing a method to secure your own safety before helping others. This means seeing that you are properly outfitted and protected to guard yourself from injury. In this preparation, taking preventative measures against eye injuries should be right at the top of your list.

irefighters need to defend themselves from heat, debris, water spray, dangerous liquids, as well as fragmentation hazards presented by saws, extraction devices, and other tools of the trade. Choosing the right eye protection to match the emergency situation is imperative to insure that a first responder can remain on scene and be effective in his or her tasks. When not using a Self Contained Breathing Apparatus (SCBA) device in the midst of fire suppression but still in the presence of hot coals, ash, sparks or other fire hazards, the deployment of a fire rated safety goggle is preferable. Unlike protective faceshields or flipdowns, fire goggles afford firefighters an enclosed area of protection that prevents the intrusion of foreign objects. The lenses of these goggles should be rated at a minimum to industrial safety impact-standards to reduce the risk of injury from

explosively-discharged shrapnel, and the goggles should furthermore be outfitted with sufficient ventilation and special lens treatments to permit airflow and restrict lens-fogging while mitigating the effect of smoke reaching the eyes. Lowerprofile goggles are the latest innovation in this field, with many products meeting the requirements of NFPA 1971, which don't interfere with any type of helmet, and can easily be doffed to stow upon the helmet or in your turnout pocket when not in use. Note that properly certified products will bear appropriate markings upon the goggle-lens, so check before you buy.

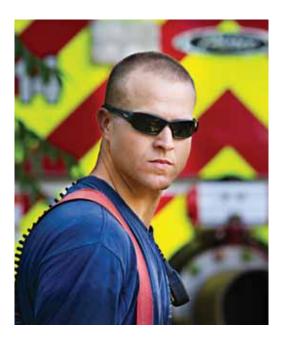
Firefighters not actively engaged in fire suppression and EMS workers in general are confronted with an even wider range of unknowns. Yet throughout the nearly infinite range of possible call scenarios, the need to wear eye protection

our First Line

remains universal. The eyes are easily damaged and have far less capacity to heal compared to other areas of the body, so eye injuries are almost always extremely costly and can easily end up being career ending or life-altering. The good news is that the vast majority of these hazards to the eyes can be easily mitigated by wearing a safety rated pair of eyeshields or sunglasses.

Regulations determining what eyewear is appropriate for use are limited, most referencing only the internationally recognised European or United States industrial eye safety standards, known as EN 166 or ANSI Z87.1. Establishing that a piece of eye protection you are considering using on your job meets these standards at a minimum is the first and most important step to ensuring your continuing safety. Other products are intended only for casual use and cannot be counted on to protect your eyes. As with goggles, check any spectacle or eyeshield for subtle EN or Z87 markings on the frame and lens to determine whether or not it is applicable for use. Also be sure to check that the products you choose are meeting the most recent versions of the standards, because products which only meet older versions are proliferate throughout the market as manufacturers are not yet required to comply with the most up-to-date safety criterion. Those products today which meet older versions of the standard but are still permissible for use do not provide the higher level of protection called for by the newer revisions. In the case of ANSI Z87.1 products, you can determine whether a product is rated to ANSI Z87.1-2003 (the older version of the Z87.1 standard) or ANSI Z87.1 2010 (the most recent version, which provides for better side-coverage and implements a test for high mass impactresistance) by looking either at a product's box/marketing material, or at product details as found on the manufacturer's website.

You may also wish to educate yourself to the many available sunglasses and eyeshields which provide impact protection greatly exceeding that which is provided by ANSI Z78.1 products, most of which commonly reference the U.S. Military Specification Standard, MIL PRF 31013 (Clause 3.5.1.1). Providing impact protection at over six times the level called for by the ANSI standard, the increased protection afforded by these products should come with no weight, performance, or price penalty. Eyeshields in particular are commonly rated to this impact standard as they are often also intended for military use. As such, they may also utilise other advanced technologies such as anti-fog lens treatments, adaptable/interchangeable lens and frame components, or other features to provide their users with maximum performance in even the harshest of environments. Many spectacles or sunglasses now also meet the US military standard for impact, and can thus be relied on to provide the most advanced eye protection while being complimented with a wide range of addi-



tional features, so careful research into your needs and tastes is advisable to help you make the right investment into the preservation of your eyesight.

Products in the Eye Safety Systems (ESS) Cross-Series such as the anti fog CrossbowTM are representative examples of the broader coverage and many desirable features afforded by an eyeshield, whereas products like the new ESS RollbarTM reveal a sport sunglass that has been transformed to meet the dangers of public safety duties while simultaneously employing desired features like interchangeable lens tints, improved fit, and compatibility with all manners of headborne gear.

In the end, the public safety professional who is adequately self protected before taking emergency action in their job is the one who will achieve the greatest results while incurring the least chance of loss. With municipal and state budgets constrained around the world, firefighters and EMS are constantly called upon to do more with less, and the strain of this reality reveals itself in the high-level of emotional burnout and the increasing numbers of casualties occurring in the field. Naturally, the general population is unable to reduce their demand on firefighter and EMS services regardless of this strain, so the cycle continues and the public safety professional must fall back on the key axioms of self preservation in the face of the public's unceasing need for assistance: trust in your training, and trust in your gear. Eye protection is perhaps the most key piece of safety gear that is not fully regulated for use, so be sure first of all that you are using it, and then make sure that you are wearing it faithfully throughout the course of your duties. You just might end up relying on it when it matters most, and in turn that could keep you in the fight to save lives. IFF

Ari Drougas worked as the Communications Manager at Eye Safety Systems

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Jessica King

Devon & Somerset Fire

& Rescue Service

Class A foam concentrate is a synthetic chemical additive that reduces the surface tension of water so it can penetrate combustible fuel surfaces. When mixed with water it creates a foam solution that is more effective than plain water for flame knockdown and fuel cooling when used for a fire attack.

compressed air foam system (CAFS) consists of a water source, a fire pump, an air compressor and a foam proportioning system. This system aspirates the solution by introducing compressed air, which allows for a more efficient use of the firefighting media. This move from hydraulic to pneumatic pressure enables fire crews to maximise their water supply and ultimately reduce the property damage that can occur when fighting fires with water alone.

Class A foam concentrate supplied through CAFS enables a more efficient use of resources, which has undoubtedly led to an increase in Class A foam use within fire services across the world. More importantly, this has had a positive impact upon firefighter safety. By reducing knockdown times, the use of CAF can dramatically decrease the exposure time for firefighters within risk areas. Using well trained techniques, the resulting reduction in heat and toxic by-products can have only a

COMPRESSED AIR FOAM



positive impact upon firefighter safety.

Class A CAFS can be used in wet and dry modes, each offering different benefits. Wet CAF is used for fire attack and cools fuel surfaces. The bubble structure created by the CAFS enables the firefighting media to adhere to three dimensional surfaces. This allows the majority of the finished media to evaporate and cool on the fuel surface.

By removing a quantity of water from the mixture, a shaving foam consistency dry CAF fire-fighting media can be produced. Dry CAF should not be used for fire-fighting attack. Its purpose is to create a protective barrier and to provide exposure protection to reduce the impact of an impinging flame against a nearby building or structure.

Within Devon and Somerset Fire and Rescue Service (DSFRS), CAF has been used operationally and has provided a more targeted efficient use of resources at certain incident types. Crew Manager, Matthew Head, a CAFS instructor at the DSFRS Academy said: "Within the Academy we impress upon students the importance of a clear underpinning theoretical understanding of Class A foam and CAFS. This is reinforced with reference to case studies based upon recent incidents and real hands on practical sessions to ensure that all our personnel are operating using safe, effective and quality assured techniques".

The Training Academy teaches students how to use Class A foam and CAFS, and also focuses clearly on when it should not be deployed, which is why quality training underpinned by clear policies and procedures is the cornerstone of the Academy's approach to training. Matthew Head explains: "We do not teach the use of CAFS for internal firefighting. There are currently no guidelines for the use of CAF as a gas cooling media in compartment firefighting".

As already pointed out, a major benefit associated with using CAF is that the water usage is greatly reduced. When water is used at fire related

incidents, around 80 percent of this firefighting media is lost in run off, which ultimately can be full of contaminant. This can end up washing into surface water drains and other water supply systems. Another advantage of using CAF is that the hose lines are around 60 percent to 70 percent lighter, which makes a huge difference in terms of manual handling.

Matthew Head continued: "In the 1980s, Class A foam was extensively used for wildfires in the USA. Over the past three decades we have seen its use develop into other incident types. Locally we have seen it used at thatch (roofs built with straw or water reed) fires, fuel spill/pool fires, large refuse disposal sites and wildfires to name a few. With the current international financial climate it is not surprising that the use of Class A foam through CAF systems is becoming an international trend; fire and rescue organisations are having to solve an equation that involves improving firefighter safety within an ever decreasing pool of resources"

CAF can be pumped over large distances, due to the use of pneumatic pressure rather than hydraulic pressure. Station Manager, Chris Pratt, a CAFS trainer at the Academy added: "It is very important to emphasise the hazards of using pneumatic pressure to the students on courses as firefighter safety is always our top priority". Ultimately one of the main benefits of CAF to DSFRS is that it is a more efficient use of resources. The jet has a longer reach, approximately 20 percent further, which allows the crews to stand further back when they are defensive firefighting and therefore improving firefighter safety."

Matthew Head recounted: "When I was onstation I attended an incident at a tyre remoulding factory. At the time of the incident the introduction of CAF was in its infancy within DSFRS; only one watch in the city was trained in its use and many of the flexi-duty officers were unaware of its



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benefits. In the early stages of the incident a lot of water was used to try to extinguish this large fire, when in actual fact it was achieving nothing, particularly as we had difficulty getting water to the incident." He continued: "The fire was well developed and was not going out with the water being applied so, after a discussion with the officer in charge, it was decided to try CAF. The wet CAF quickly soaked in and started to cool the pyrolising surfaces, the smoke disappeared and visibility improved". Once CAF was deployed, around 50 percent of the fire had been extinguished in roughly ten minutes and, at this point, the watch had been there for well over two hours.

At this particular incident the eight pumping appliances had delivered nearly 400,000 litres of water in over two hours of fire attack. The single CAF unit extinguished the fire using 2,200 litres of water and 11 litres of foam concentrate in a fraction of the time. It is important to stress that





CAF is not right for every incident; it is another tool for firefighters to use in the correct situation supported by robust policy, procedures and quality training.

From 1st April 2011to 31st March 2012 DSFRS attended 762 vehicle fires (vehicle fires account for only 14 percent of all fires attended in that time period). If crews had used water only at these vehicle fires then approximately 1,143,000 litres of water would have been utilised. With water use, traditionally, there is about an 80 percent run off, which contains diluted toxins that disappear down the drain. In that same time period, if CAF had been used exclusively using DSFRS procedures those same vehicle fires could have been extinguished using just 22,862 litres of water.

With car fires in particular the principle when using CAF is that all of the firefighting media should be contained within the vehicle. Matthew Head explained: "As a fire service we are trying to encourage innovative, safe and efficient techniques that challenge the traditional techniques we have always used. We are learning from our experiences operationally and have been feeding this back into our training".

Anyone wishing to train in CAF would need to make a strategic decision as an organisation as to whether they would like to go down this route. The importance of having the correct training is that CAF uses pneumatic pressure rather than hydraulic pressure and there is a risk involved in that. If an organisation does make the decision to use CAF there is an initial investment involved including training, the Class A concentrate, the CAFS itself and smaller fire engines if required.

COMPRESSED AIR FOAM

With CAF, smaller volumes of water can be carried on fire engines meaning that the media is being used much more efficiently. Therefore a small appliance has the firefighting capability of many fire engines, which enables more efficient use of resources. The benefits of smaller fire engines include less weight due to the size and the smaller amount of water needed. Better access can also be gained to incidents in places like Hong Kong, for example, where the roads are narrow. Much smaller fire engines would be of great benefit with regards to ease of access to incidents and would cut the response time greatly.

Recently, Wicklow County Council in Ireland pleaded guilty to safety violations and was fined ≅ million. Firefighters Mark O'Shaughnessy and Brian Murray died at an incident where CAF was used incorrectly in 2007. Mr O'Shaughnessy and Mr Murray entered the disused ink factory with CAF and had to be rescued when they did not respond over the radio. Two other firefighters attempted to rescue them using a 'pulsing' technique with the CAF; however, it failed to work in the way they expected and had no effect. It became apparent during the hearing that they not been given hot fire training using CAF. This incident clearly highlights the importance of receiving the correct training and having robust policies in place.

The Training Academy backs up its CAF training with a vigorous policy, highlighting that the service is not moving away from fire behaviour techniques and that CAF is just another useful firefighting medium to be used in certain instances. It is also evident from the County Wicklow case that CAF training needs to be provided for different types of firefighting incident scenarios. Chris Pratt pointed out: "If our crews decide to take a CAF branch in to a compartment fire they must have a safe system of work that is gas cooling, with water at the right droplet size and at the right pressure".

The Academy is an Institution of Fire Engineers and Edexcel accredited training centre. The DSFRS Academy has designed a day-long course for Class A foam. It touches upon operation and focuses on the hazards and risks involved as well as the theory behind the application of Class A foam at different incidents. The Academy is in the process of building a thatch training rig, which will look at how CAF can be best used at thatch incidents.

The Academy is currently looking into utilising a car that will be used to simulate vehicle fires. The Training Academy CAFS courses can be tailored to suit individual needs. CAF refresher training is available and the Academy instructors are happy to offer advice if needed. DSFRS has gathered a large amount of evidence-based information, data and case studies, policies and risk assessments through using CAFS operationally and for training for the past 15 years. The Academy can also offer Class A and Class B foam courses.

Jessica King is Training Academy Commercial Support Manager at Devon & Somerset Fire & Rescue Service

For more information, go to www.dsfire.gov.uk/ trainingacademy



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Rod Carringer

Task Force Tips

Choosing the Right Firefighting Nozzle

With hundreds of models of handheld firefighting nozzles from which to choose, the choice can be confusing and the decision making process often frustrating.

efore investigating which nozzle may be an ideal choice for initial attack fire flow operations, one basic factor must be considered before all others: Determining the agency's target fire flow will be critical to the overall success of the nozzle choice. To assist in this determination, several questions about departmental operations need to be answered. How many litres a minute are required to absorb the heat being generated by the fire during initial attack? What are the most predicable fires, their contents, and size (based upon department historical experience and what flows have been successful in the past)? What is the experience level of the firefighters expected to participate in initial attack operations?

Ideally, after some review, and taking accepted fire flow formulas into account, a target fire flow will be determined. This minimum flow to be provided to the nozzle team will be used to determine pump discharge pressure after taking into consideration hose size, length, and nozzle operating pressure. Once the determination of pressures, losses, and minimum flows are taken into account,

operational guidelines can be established to consistently and repeatably provide the nozzle operator with critical flow performance.

Now, the next step: choosing the best nozzle to meet the agency's operational needs. From a features and benefits standpoint, we will review key performance criteria and offer benefits and drawbacks for each characteristic. Generally, choice of nozzle pressure regulation, type of shut off valve, fog tooth design, and pattern shaper configuration are the most critical elements examined during the primary evaluation.

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- Fixed Litreage. This nozzle style is designed to provide optimal straight stream and fog pattern performance at its rated pressure and flow. Over pressurisation of the nozzle creates unacceptable nozzle reaction for the operator, and under pressurisation produces an ineffective stream.
- Selectable Litreage. Optimal stream performance is achieved at the selected flow at the rated pressure. To maintain maximum stream

FIREFIGHTING NOZZLES



performance when litreage selection changes are made during operations, corresponding changes must take place in the pump discharge pressure. Much like the fixed litreage design, over pressurisation of the nozzle at a given selection creates unacceptable nozzle reaction for the operator, while under pressurisation produces an ineffective stream.

- Automatic. Using a unique design that incorporates an internal spring and hydraulic balance, these nozzles provide optimal straight stream and fog pattern performance over the entire rated flow range at the rated pressure. These nozzles are commonly referred to as constant pressure/variable litreage nozzles and standards require that the nozzle's rated flow range and pressure be indicated on the labelling of the nozzle. The automatic nozzle's pressure regulation provides the nozzle operator consistent reach and penetration (even while gating of the nozzle) without changes in pump discharge pressure.
- Automatic with Flow Limiting. In addition to offering the same stream performance characteristics across a broad range of flows as the standard automatic nozzle, these nozzles incorporate a user-defined flow limiting selection restricting maximum flow. Some models also offer a fixed high flow setting at a reduced operational pressure.

In summary, there are many choices of flow and pressure regulation currently available. While the fixed and selectable litreage styles initially appear simplistic in nature, they rely heavily on predetermined and proper hydraulic and pumping operations to achieve and maintain the target flow during operations. Automatic, constant pressure/variable litreage nozzles can provide a level of simplicity and flexibility in rapidly changing fireground conditions thanks to their self-regulating design.

Rated nozzle pressures can also vary from 7bar to 5bar and even lower in many designs. While

lower pressure (lower exit velocity) can reduce nozzle reaction somewhat for the nozzle operator, the reduced velocity of the stream will also provide less reach and penetration. When working with foam, lower operating pressure nozzles can often produce a higher expansion and longer lasting finished foam.

Shut Off Valve Style

- Ball Style Shut Off. The most commonly used style of shut off, the ball valve design and all of its variations, is typically used in the fully open or fully closed position. Any gating of the valve to reduce flow or nozzle reaction during operation creates unwanted turbulence in the waterway resulting in a poorly performing straight stream and degraded fog pattern.
- Slide Style Shut Off. The slide valve style of shut off (similar in design to a needle and seat valve) allows the nozzle operator to vary the position of the valve without creating unwanted turbulence in the waterway. The nozzle valve can be gated to restrict flow, yet will maintain optimal stream performance in all positions.

Final choice of either the ball or slide type of valve should be accompanied with training and operational guidelines to support the creation and maintenance of optimum stream performance for the initial attack crew. With the ball style of valve being most common, hose handling techniques and pump pressure choices should be practiced to avoid the nozzle operator gating the ball valve and degrading the stream. When using a slide style of valve, nozzle training should stress that the nozzle operator has full control of flow, using a little when necessary, or opening the nozzle fully to achieve the targeted fire flow. In either case, choosing valve designs that incorporate time tested materials such as stainless steel has been proven to result in reduced maintenance costs and ensures your equipment's long term durability.

Fog Tooth Design

- **Spinning Tooth.** Designed to provide a very wide protective fog pattern, the spinning tooth design is one of the most common designs used worldwide. With the water being directed to the outer portion of the pattern to gain the wide angle, a central hollow core typically exists with this style of design. This hollow central core can often draw heat, flame and smoke back towards the nozzle operator. The protective nature of the fog pattern can also be easily degraded if the teeth are prohibited from spinning due to debris, or if the teeth are bent, broken, or missing (making regular inspections imperative). Often stainless steel spinning tooth construction is preferred over plastic for durability, long term reliability, and crew protection.
- Moulded Rubber Tooth. With a fixed tooth style, often the teeth are an integral part of the front bumper of the nozzle and are bonded to a metal shaper underneath to provide maximum durability. This style of tooth, which does not provide as wide a pattern as the spinning tooth design, directs water towards the central core of the fog pattern creating a fully filled fog pattern. This style of pattern tends to push heat, flame, and smoke ahead of the nozzle operator as the hose line is advanced on the fire.

FIREFIGHTING NOZZLES

• **Fixed Cut Metal Tooth.** This tooth configuration is a variation of the two previous designs and offers not only a fully filled pattern at a given selection, but when rotated further, will expand to a wide flat style of pattern more commonly recognized as a spinning tooth design. Cut from metal on the front of the nozzle bumper, this style of pattern is very rugged even in the harshest firefighting conditions.

Often pattern selection, just as using a nozzle with a pistol grip, is determined as much by past practices and the existing equipment in use as it is on the actual performance differences among the fog tooth designs and pattern styles. No matter which selection is made, safety of the nozzle team should be the number one consideration. The front of any nozzle is capable of seeing very harsh conditions and rugged use during firefighting operations. Regular inspection and repair of nozzles, specifically the components that provide the protective fog pattern is essential.

Pattern Shaper Detent

- Fixed Tactile Indicator. These indicators, an integral component of the pattern shaping bumper, provide a visual and tactile indication of the stream pattern selection of the nozzle. When fixed, these indicators are typically set to the top of the nozzle when it is in the straight stream position.
- Tactile Indicator with Pattern Detent. This style of indicator incorporates an integrated detent ball within the pattern shaper and allows a set pattern selection to have a tactile and audible feel. This style allows a detent to be integrated at a given pattern selection, such as a partial fog position, which can be noted by the nozzle operator as the pattern shaper is rotated in dark or smoky conditions.
- Tactile Indicator with Lock Out. This style of indicator incorporates a lock setting that must be manually overridden by the nozzle operator to access other stream settings. An example of this would be to restrict the ability of the nozzle to go to straight stream to prevent plunging the stream into flammable liquids or, to prevent the nozzle operator from selecting a fog pattern position when entering an unventilated room and contents fire. The pattern can be easily overridden to choose other pattern selections.
- Locked Tactile Indicator. If no other pattern selection is desirable, the indicator can be locked into a predetermined pattern selection. This style will allow no other pattern selections





by the operator. An example of this lock out choice is for nozzles designated for use on fires where energized electrical components may be present. A modified fog pattern may be the sole choice of the agency having authority.

Tactile indicators are an ideal choice for departments trying to meet individual operational performance criteria. Often international standards may dictate certain lock out configurations, and in other situations, just having the nozzle operator know, with the feel of a detent, that a pattern selection has been achieved is a critical operational consideration.

Possibly not as essential as the previously noted nozzle design elements, there are also other characteristics that should be considered when making a decision. Two-piece nozzles, ball shut off combined with a nozzle tip, can offer some additional tactical performance if the need to remove the tip and add additional hose line is required. This configuration is often found in departments who have specially designed hose bundles for high rise firefighting operations, or in areas where wildland fire operations are common. Equally important are international standards for nozzles that through either self-certification or third party testing can provide a level of performance and materials verification not easily accomplished at the fire department level.

In summary, the choice of the proper nozzle for the initial attack operations is not an easy process. But, with proper investigation, determining the agency's target fire flows, and identifying key performance criteria that are essential to the operations, the decision can be based more on facts, and less on just purchasing what the next latest, greatest and extensively marketed product may be. From a safety standpoint, choosing a rugged, time tested and factory supported product is essential. For additional information on nozzles, operational guidelines, or the newest in designs, the worldwide web offers countless opportunities. But, as a final suggestion; always use the nozzle you are considering in both demonstration and field evaluation. Only then can you be assured you are getting the best value for your investment.

Rod Carringer is the Chief Marketing Office at Task Force Tips

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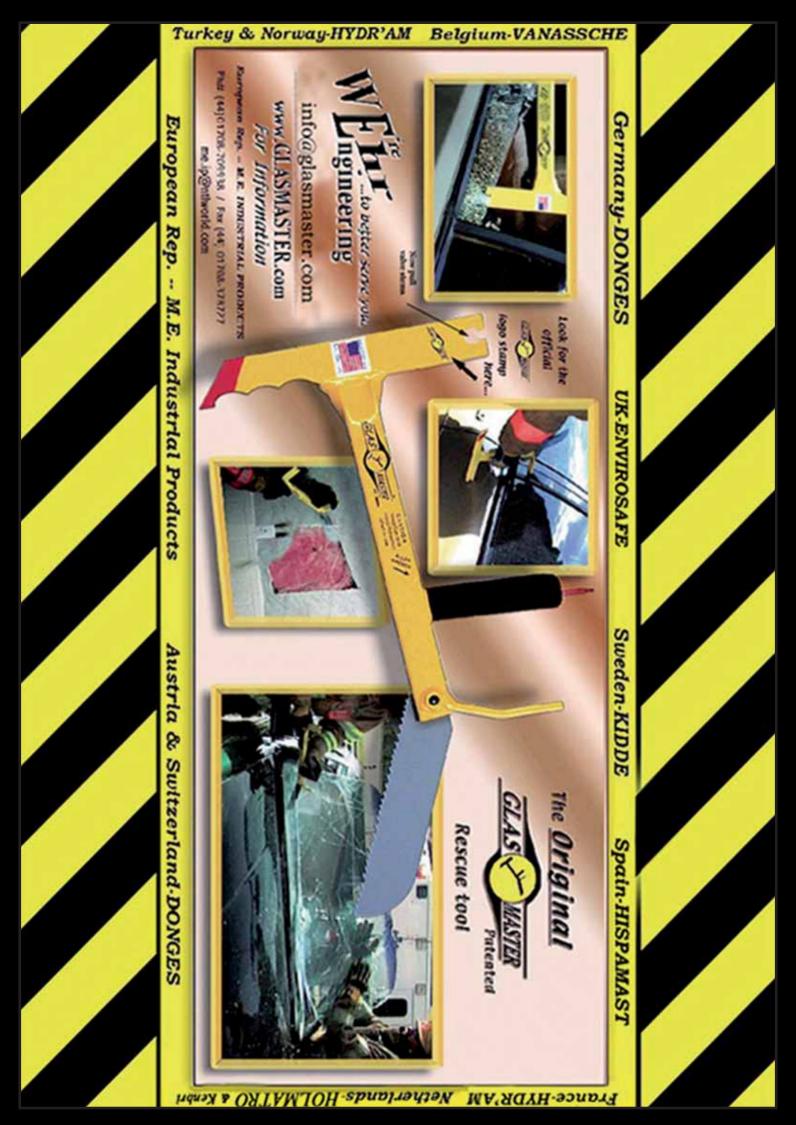
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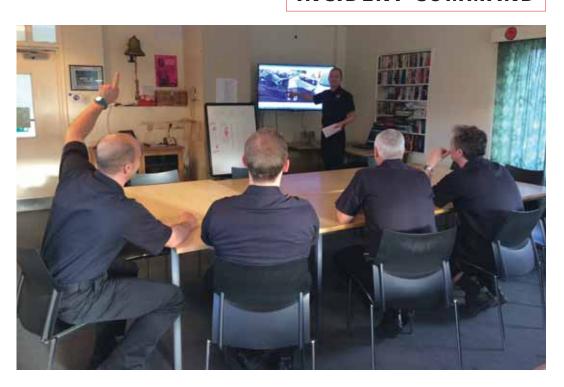
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INCIDENT COMMAND



Vehicle Extrication Challenge or the Public Highway



Paul Maynard

The role of the Incident Commander

So as a Watch or Crew Manager in charge of a Watch or a Fire and Rescue Service Extrication Team Leader, what is your role at a Road Traffic Collision (RTC)?

am convinced that, if we put a number of Incident Commander's (IC) from different fire and rescue services in to a room, we would come up with a fairly standardised answer. It is fair to say it would involve such items as health and safety of all involved, the communication between your team and other agencies, ensuring that the proposed tasks are being carried out. You are coach and/or mentor and you lead as required. Much has been written about leadership skills over the years and yes, they all come into play as well.

However in my opinion it is much much more than that. It begins way before you even get off the appliance. It starts back on the Fire Station in a classroom. It starts with you as the Crew or Watch Manager or an Extrication Team Leader having a passion for all things RTC and the desire to be the best you can possibly be to deliver the most efficient service to the public you will be rescuing. It's about going onto YouTube or Twitter and looking at all the latest tools and techniques from all over the world and it's about working and talking to companies that make extrication equipment. It's about looking for new ways of working. It's about finding new technical cuts you can make, new ways of working to get casualties out of the vehicle in a shorter time frame. It becomes a mind set and this must be passed on from the Incident Commander or the Team Leader to everybody involved at the incident.

Throughout this article, I will pass on some of techniques and skills I have used to train our

51

INCIDENT COMMAND



operational crews and extrication team. These have led us to be far more efficient on the road in Berkshire and also led to us becoming World Champions for the last three years consecutively. Some of you may not be convinced and feel that Rescue Challenges are nothing like a real incident. However, after booking in attendance and ensuring crew safety on the road, the team approach taken from the national RTC manual still applies. That is what we use in an extrication challenge and on the road in Berkshire. We are fortunate to have one of our extrication team members in our Learning and Development Centre (L&D) and can therefore shape the way the organisation trains in line with best practice.

Now, you will all receive RTC training from your L&D centre. This may be in the form of a one or two day course and may be on a yearly cycle or otherwise. I have no doubt that it will be of a very good standard, but there is only so much that can be delivered in this time. Therefore, it comes back to the IC or Watch or Crew Manager to cover and deliver all the all the other skills and information available. I shouldn't think many L&D centres have the time to allow all the tool operators to construct a pyramid of plastic cups full of water with the hydraulic spreaders, but it will greatly improve your dexterity, awareness and confidence with the tool!

As already mentioned, the Team Approach from the manual is your best guide. I would supplement this with the assessor sheets from the United Kingdom Rescue Organisation (UKRO) website as they are a great training aid. One main point is that it does not matter who is riding in what position, as everyone will be fully aware of their

roles and responsibilities the minute they dismount the appliance and start thinking as one. A good way to practice this is to task someone to set scenarios for you and the team with a casualty in different positions and with different injuries each time. As the IC, form a plan and, if the team is as tuned in as you, then the plan should be similar, i.e. roof removal or side removal and the techniques you would use.

We all know that the team approach works, as this is the gold standard laid down in the manual and it is the most efficient and effective way of working. With this in mind, I will now cover the key issues that, for me, can make the

biggest impact at an RTC and which I have seen a fair amount of on the road and at extrication challenges.

As the Incident Commander, when you first get off the appliance the key issue must be to ensure the scene is safe for all in attendance. This will involve you completing an outer 360° survey as quickly as possible, taking the casualty carer with you. Between the two of you, a decision can be made as to the most appropriate entry point into the vehicle in order to assist both the casualty and the developing rescue plan. After covering all the outer hazards, the IC must approach the vehicle from a safe position and carry out a quick

internal survey. This will involve looking into the vehicle and checking for any hazards such as the supplementary restraint systems (SRS) and anything else visible. At this point you can brief your casualty carer to approach the vehicle.

As you return to the appliance you should have personnel ready with the appropriate stabilisation equipment for the task they face and waiting for your hazard briefing. A common situation that can occur is that the remaining crew are setting up a tool compound with every piece of RTC kit being taken off the appliance; meanwhile no one has made contact with the patient. This can take a considerable amount of time and is unnecessary work at this stage. Remember it is our role to carry out a casualty centred rescue involving basic life support.

You will now inform them of all the hazards, any patient information available and task them to stabilise. Nothing more needs to be said as all your time pre planning will take over. In addition, I would expect those personnel to report back with any technical inner and outer issues they encounter. In my opinion, once the vehicle is stabilised and made safe, the key is to get your casualty carer into the vehicle as soon as possible.

You now have a couple of minutes thinking time to plan. You must liaise with the casualty carer to obtain an initial briefing on any injuries and obtain further technical information from those stabilising as to the damage and impact. It is crucial to obtain an assessment of the car seats. Will they move? Are there any other limitations? Again your pre-planning, training and experience will guide you to offer various plans to the casualty carer to confirm a route out.







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INCIDENT COMMAND



Once they have stabilised its now to one of the key areas – your IC briefing. This is vital and will dictate all your efforts for the rest of the evolution. In my opinion, you should gather everyone together, except the casualty carer, to ensure they are all aware of your plan. At this point, you can obtain any further information that they may have, confirm with them the hazards, the casualty's injuries and let them know what you require. As already discussed, if you are a well practised Watch or Team, there should be no surprises and the briefing should be straightforward.

I would advocate stating the 'emergency plan', ideally the exit nearest the casualty if possible, but remember it must be viable! I would state the A plan, i.e. 'side removal' with any additional issues such as body work relocation requiring the hydraulic ram and this would then be supplemented with the 'B' plan if circumstances change. If you are an experienced team or Watch and proficient with the team approach, no more is needed other than to take/ask for their suggestions and/or confirmation of the plan.

The reason I am not so prescriptive with regard to the technical team is that I allow them to judge what is best for them to achieve my plan. If I have asked for a side removal, I will expect them to tell me how they wish to technically carry this out, for example by either a rip or post out. They will know what is the most efficient; taking into consideration what doors will open by hand without the need for hydraulic equipment.

Once the plan is in play this is where your command and leadership skills come to the fore. If more appliances arrive, you can deal with them and brief accordingly. If an officer arrives to take over, again, he can deal with the outward facing issues with the other agencies present and you can concentrate on the technical rescue. Depending on the work required or vehicles and patients

involved, it may be that you need to get two teams up and running or bring more casualty carers into play. If everybody is trained up to team approach, it should cause no issues and everybody should fit seamlessly into your plan, once you have briefed them.

Now you need to stand back and monitor all the tools, techniques and work taking place ensuring that technical teams are rested and rotated every three or four cuts. Again, this demonstrates your incident command skills and can prevent tunnel vision from tool operators and you can step in as required. You must remain conscious of all the health and safety aspects of the incident and continue to obtain regular updates from the all the team as to progress. You must ensure that appropriate information is passed on to the partner agencies in attendance.

Once all the space is created and it is time for casualty removal, it is imperative that as the IC, you continue to remain focussed and ensure that the spinal board work is as effective as all the rescue techniques you have employed so far. This is another area of work that must be practiced on a regular basis so that everyone knows their positions to ensure confidence and competence.

I have only really scratched the surface on what I see as the role of the Incident Commander at an RTC on either our road networks or at an extrication challenge. From what I see in my own FRS and in others, I would suggest that we all carry out most of the above on a regular basis however, as we move into a new age of vehicle manufacture, we will need new tools and techniques to cope with these changes. With the best will in the world, most L&D centres will not be able to keep up with all these changes in their annual RTC training plan. Subsequently the role of the IC will be more important than ever to ensure your team is as efficient as it should be.

Paul Maynard is an Area Manager with Royal Berkshire FRS and the current Response Manager. He is still active in the development of all RTC training and equipment within Royal Berkshire. He has been a member of the Royal Berkshire Extrication Team for nearly 20 years and team leader since 2007. He lead the team to three successive World Rescue Challenge titles from 2011 - 2013 and is now an Assessor for the United Kingdom Rescue Organisation (UKRO)

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Stability at Shipb





Tom Guldner

Land-Based Firefighter talking to a ship's Master...

"Well, the fire went out"....

"Yeah but you sank my ship!"....

"I know that, but the fire did go out!"

here have been many tragic stories of fire departments valiantly fighting a fire aboard a large ship for hours, and even days, only to have the ship capsize or sink at the dock because of the weight of the firefighting water that was applied. The results are embarrassing, frustrating, expensive and sometimes fatal.

There are only three ways to prevent this disaster. One way would be to remove all of the firefighting water as quickly as it is being applied. The second way would be to use less water, or no water. The third way would be to move the water to a part of the ship where it will be less destabilising.

Removing all the water with dewatering pumps is the best. Using less water will be covered in a future article dealing with the use of fog streams and using no water will be discussed in future articles dealing with fixed firefighting appliances. So that sort of narrows down my choices for this article to relocating the water. But before we can discuss how to move this water we must first learn **why** it is important to do anything at all about this water.

Whenever you are presented with a ship or boat fire you have to take some basic laws of physics into account. A vessel stays afloat by offsetting two forces of nature. **Gravity** is attempting to push the ship down into the water (sinking), while the **buoyancy** of the water will be pushing up from the bottom. If either force wins, you're in trouble.

If you are not a Chief Officer, and never hope to be one, then all you need to know about ship stability is that any weight added to a ship, beyond that which it is designed for, may cause the ship to sink. The higher up in the ship that this weight is added, the worse the problem. OK, anyone who might ever be in command of a ship fire, (or any really smart Company Officers, Firefighters, or mariners), must have an understanding of the principles of stability. So only they should read on!

I'm in *no way* an engineer or a physicist so I probably *will* be able to simply explain just what stability is.

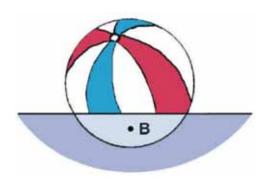
Well here goes...

The **Centre of Buoyancy** is the point at which all vertical upward forces (buoyant forces) are said

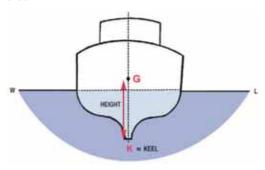
oard Fires

to act. It is the centre of the volume of the **immersed portion** of the vessel.

For mathematical equations this point is simply identified as "**B**" – a lot of deep thinking went into that choice!



The opposite force is Gravity – I wonder what letter the math wizards will use for the center of that!



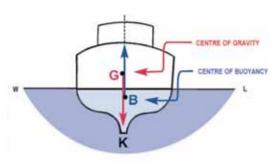
The **Center of Gravity** is the centre of the total weight of the loaded vessel and yes; the letter "**G**" identifies it. Shipbuilders know where this point should be even at the design stage of a ship's construction.

It is the point where the entire weight of the ship, <u>and its contents</u>, is concentrated. All the underlined stuff is going to be important later!

If additional, **excess**, weight is added to the ship then this point "**G**" will be located higher and the ship will become less stable, but more about that later as I'm getting ahead of myself.

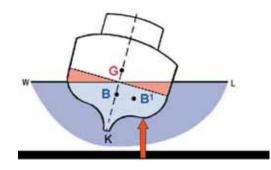
When both of these forces press equally against each other from directly opposite directions then the ship is said to be "At Rest" or upright, however this is rarely the case.

<u>External forces</u> such as wind and waves will usually change this.



If the ship was built and loaded correctly, these outside forces may cause the vessel to temporally tilt from side to side (**Heel**¹); however the vessel should return to the upright by itself. Let's say that the Exterior Force of a wave caused this ship to "Heel" over to the side.

If the weight of the ship and its contents has not changed, or $\underline{\text{shifted}}$ (there's that underline again!), then the centre of gravity (" \mathbf{G} ") will remain in place.



But look at the "B". It moved in the direction of the lower side. THAT point, "B" is now the centre of Buoyancy and the upward forces of Buoyancy will seem to <u>push harder on this lower side</u>. The result will be a return to the upright.

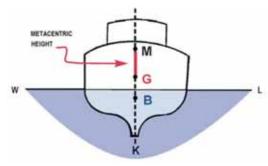
Remember, this is on a ship whose weight has not been changed or <u>shifted</u>.

Not too bad so far. That's just two letters to remember. But you know that "they" can't leave that alone. You know "they're" going to throw in another letter to confuse us.

The letter "**M**" will stand for the **Metacentre**.

Don't give up! I don't like this either but it will all come together soon (*I hope*). The Metacentre is a point near the centreline of the ship. It is a point that will **normally** be stationary and directly over the point of buoyancy regardless of which side "**B**" moves.

If you consider "**B**" as the ball at the bottom of a pendulum then "**M**" is the connecting point from which that pendulum swings.



The **Metacentric Height** then is the distance between the center of gravity "**G**" and the metacenter "**M**" and is simply called "<u>**GM**</u>". The "**GM**" is **crucial** to stability.

The further apart that "**G**" and "**M**" become so the more stable the ship and the quicker it will right itself. This long "**GM**" also causes an uncom-

MARINE TRAINING

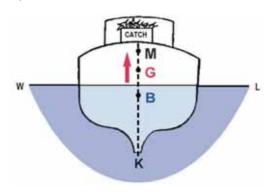
fortable whipping motion that anyone ever assigned to a Navy destroyer or frigate in the North Atlantic can attest to. Destroyers and frigates have a notoriously long "**GM**" and therefore a terrible ride!

Hey; wake up! I'm nearly getting to the end..

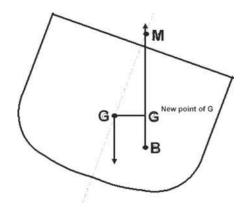
To provide a more comfortable ride, most passenger ships are built with a shorter **Metacentric Height**. This will allow the vessel to **slowly** recover to the upright and not throw the passengers against a bulkhead.

I mentioned before that as long as the weight of a vessel, and the location of that weight, remains constant, that the center of gravity would not move.

This is where *our* problem comes in as Firefighters. Weight is always added to a ship in the form of cargo, fuel, provisions, and passengers. These items have all been previously calculated in the ships stability plan and should therefore not cause a problem.

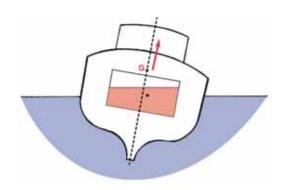


However, as the unexpected, excess weight of firefighting water is added, the ships center of gravity will rise and the vessel will become less stable. If the center of gravity rises above the metacenter the ship will capsize. Also, as the ship develops a **list**², its center of gravity may now move in the same direction as the point of buoyancy if there is also a corresponding **shift** in weight as in the diagram.(*Here's where we get to the importance of the shifting that was underlined before.)*



This new location of the downward force of gravity will now fight against the righting tendency of the new point of buoyancy that had shifted previously. The result is that the ship will no longer return to the upright. This shifting of water can also have some drastic consequences.

If an area flooded with the firefighting water is

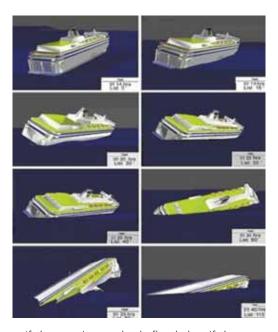


only **partially filled**, and there is no restriction to the side-to-side movement of the water, the result can be devastating (See fig. below).³ A defective bow door of this European ferry allowed water onto the **undivided** car deck. As the ship listed, the water was **unrestricted**, and rushed to the low side causing the vessel to capsize with a large loss of life.

This free movement or sudden shifting of water is called "<u>Free Surface Effect</u>" and is a major problem in ship stability during fire operations.

A defective bow door of this European ferry allowed water onto the <u>undivided</u> car deck.

As the ship listed, the water was <u>unrestricted</u>, and rushed to the low side causing the vessel to capsize with a large loss of life.



If the area is completely flooded or if there are restricting boundaries to act as baffles then the water is no longer subject to "Free Surface Effect" and there will either be no movement of the water or it will be reduced.



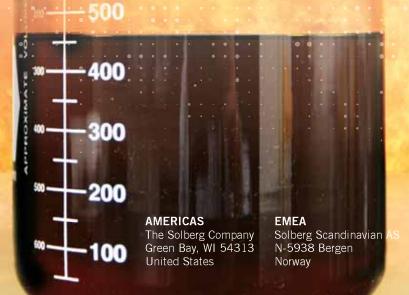


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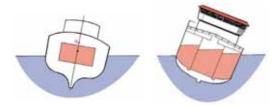
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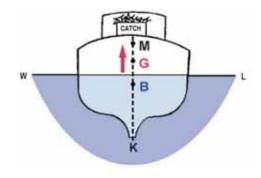


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MARINE TRAINING



The <u>location</u> of this weight is important also. Here, I finally get to the original topic of this article, "moving the water to a location where it will <u>be less destabilising</u>." Firefighting water that accumulates on the <u>upper</u> levels of a vessel will be more likely to decrease stability than water accumulating in lower areas due to the **raising of the center of gravity** which leads to listing and eventual capsizing.



If all of the water went directly to the lowest part of the ship it could actually help to make a ship more stable by lowering the center of gravity – up to a limited amount of course. This is just the same as when water is added to an empty ship to provide **ballast**. A Ideally you would first want to remove this water from the ship, but that can't always be done. Some reasons that might prevent you from removing the water overboard are; lack of pumps, lack of power or pollutants mixed with water.

W B B CATCH

Tom Guldner is a retired Lieutenant of the New York City Fire Department's Marine Division and is a Principal Member of the NFPA Technical Committee on Merchant Vessels. His company Marine Firefighting Inc. is involved in consulting and training mariners and land based firefighters in all aspects of marine fire fighting

For more information, go to www.marinefirefighting.com

Stability graphics courtesy of the Icelandic Maritime Administration. Main photograph courtesy of the US Navy In these cases your next best solution is to transfer this water as low in the ship as possible. If you have pumps but are unable to pump overboard due to the height, then you can pump the water down into the ships bilge where it can then either be pumped overboard by the ships own bilge pumps or it can remain at this safer, lower area although you will still have to be monitoring the ships draft!

One trick that has been used successfully at many ship fires to send water to lower levels, and which doesn't require the use of pumps, is to break apart toilets in any flooded upper

lever accommodation spaces. This will allow the water to drain into the ships sanitary tanks which are located in the lower levels of the ship. If the Coast Guard permits, these tanks can then be pumped overboard. However, it's not likely that the Coast Guard will approve due to environmental reasons. However, at least the water will now be at the lowest level, which is less destabilising.

To sum up, anytime you are going to be putting firefighting water on a ship you must simultaneously begin removing or relocating that water. When starting any dewatering operation you must realise that the priority must be given to upper areas especially those that are subject to the "Free Surface Effect". Here is the only math formula I want you to learn. "1 litre in" minus "1 litre out" equals "no problem from your firefighting water."

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One of my first calls at a ship fire would be to the Coast Guard to send someone to monitor stability as they know what they are doing and can relieve you of this task. Although until they arrive it will be up to you but it's worth noting that the ship's licensed crew members should also have a good knowledge of vessel stability.

I hope that this article was written clearly enough so that you now understand the basics of this topic.

¹**Heel** – The <u>temporary</u> tilting of a vessel from side to side. If this tilt becomes permanent then it is called a List

²List – A <u>permanent</u> tilting of a vessel to one side or the other

³Investigations into several recent ferry disaster investigations in Europe, such as the vehicle ferry MV Estonia, have listed the "Free Surface Effect" of water on the open vehicle deck as a cause for the sudden capsizing of the vessels. Photo credit – The report of the Joint Accident Investigation Commission

⁴Under normal circumstances, after a ship is unloaded, the Ballast Tanks in the ships lowest levels are filled with sea water to increase the ship's stability. The ship is then said to be **"In Ballast"**.





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RURAL WATER SUPPLIES





A. K. Rosenhan, PE, CEng., CFO, FIFireE

Rural Water Supplies

- The Oktibbeha County Way

From time immemorial water has been the basic weapon of the Firefighter. From the Roman "squirt" devices to the modern engine driven pumps, applying water to a fire is the basic attack weapon and solution to fire.

ertainly water distribution systems in towns and cities have been around for over 175 years and in many cases simple hose streams from fire hydrants have been sufficient to combat fires. But in rural areas there are no or very limited water distribution systems and water must be either transported to the incident scene or provision made to utilise a static water source such as a pond or stream for additional volumes. Such additional sources, whether used to fill apparatus tanks for transport to a scene or for immediate firefighting employ a variety of hardware and operational methods.

Certainly there are numerous methods by which water is applied to a fire scene; these include sprays, solid streams, CAFS (Compressed Air Foam System), water/foam, high-pressure fog, at low and high pressures, and combinations thereof. But there is a common thread to all such uses which is a consistent and adequate water supply. There are all sorts of specialised hardware items, in addition to the simple fire nozzle, that are carried on fire appliances and the amount of water needed is dependent on the property on fire. In addition to the firefighting water there are also water requirements for dilution, wash downs, decontamination and other uses other than being applied on a fire. Hazardous Material operations alone require significant water supplies for a variety of needs and uses.

Most fire appliances carry an on-board supply of

water which is used for an initial fire attack or other application. Even today, with the powerful engines and appliances available, the volume of this initial attack water is limited. In the USA a typical fire pumper will have a minimum capacity of 500 US gallons (1,900 litres) supply although this may increase to 1,500 US gallons (5,700 litres). Various other appliances, such as aerial devices, brush trucks, and tankers (sometimes called tenders) will have various size tanks and pumps dependent on local needs. While engines are powerful, there are weight restrictions on roads and bridges which is especially true in rural areas where access to a fire scene may involve substandard (weight limited) bridges, cattle gaps, narrow driveways and treacherous roadways.

The method of attack, as well as fire type and size, will also determine the efficacy of a small water supply with a larger supply obviously better suited for fire attack.

Of the 30,000+ fire departments in the USA, most are smaller rural departments that do not have the luxury of a hydrant-based or pressurised water supply. Likewise these departments are usually limited in manpower at the initial response with the time required to traverse the distances from a fire station to a rural location allowing a fire to grow significantly. Even if a small town has a domestic water supply it will be limited in flow, pressure and sustainability to adequately support

RURAL WATER SUPPLIES



fire flow demand and therefore water must be transported to an emergency scene by various types of tank equipped vehicles.

In addition to the need to provide the resources to safely combat a fire there is the aspect of insurance rates. Various insurance companies, standards making organisations and governmental regulatory bodies' rate fire departments on the basis of the number and type of appliances, responding firefighter numbers and capabilities and adherence to National Standards such as those promulgated by the NFPA (National Fire Protection Association). The results of the rating significantly affect fire insurance rates and while there are several such rating methods in the different states, Mississippi has a privately run agency. The Mississippi State Fire Insurance Rating Bureau, which evaluates and rates fire departments and municipalities on a variety of Fire Protection capabilities. In addition to the fire department itself there are considerations given to fire codes, construction standards, water supply and/or transport capabilities, as well as personnel training and participation.

A Class 10 rating is the basic evaluation and requires a fire department to have a minimum 500 gallon/minute (1,500 litres/min) pump, an on-board water tank with a minimum capacity of minimum 500 US gallons (1,500 litres), a list of tools and equipment, a minimum hose supply and a minimum number of fire fighters attending each call. With increased capabilities such as a continuous water supply, career firefighters, fire codes, apparatus capabilities and a list of additional resources results in the Class Rating being reduced. A Class 1 rating is the best attainable with reductions in the Class Rating resulting in a reduction in insurance rates.

For a rural department to reduce the basic Class 10 Rating the provision of a better water supply is the basic criteria. If the Department can provide up to 15,000 gallons (57,000 litres) of water to a scene in one hour, a basic 250 gallons/minute (950 litres/min) a Class 9 may be achieved. If the total amount is 30,000 gallons (114,000 litres) the flow rate is increased to 500 gallons/minute (1,900 litres/min) a Class 8 will result.

There are several rules and guidelines regarding the supply of such water volumes, namely the number of vehicles involved, the distances from a fire station, the provision of a water supply to the scene, the number of personnel involved, basic hardware lists, etc. The reduction in fire insurance rates by reducing the rating from a Class 10 to a Class 8 may be as much as 30%. There are corresponding reductions in insurance rates for lower classifications

but the 10 to 8 reduction sees the greatest percentage saving.

In most rural areas a tanker based water supply system is employed to provide adequate and reliable amounts of water to a scene. This water shuttle operation is pretty simple; the first arriving vehicle starts a fire attack using an on-board water supply and deploys a portable tank or dam. Other arriving water carrying vehicles dump their loads into this portable tank and then scurry off to refill their tanks for eventual return to the scene.

These portable tanks will vary in capacity from 1,000 gallons (3,800 litres) to 3,000 gallons (11,400 litres) and are sometimes ganged together. Suction hoses are employed to get the

water from the portable tanks into the fire pump and high flows may be achieved dependent on the length and diameter of the suction hose used. The discharge flows from the fire pump are the usual configuration which achieve and the normal flows and pressures appropriate to firefighting.

Oktibbeha County, Mississippi is somewhat unique as the County Fire Departments utilise overhead water tanks for rural water supplies. These tanks are elevated, not pressurised and are usually located on a rural water system and located at strategic points. Such rural water systems simply do not have the flow or pressure capacity to support a fire flow operation although they are capable of filling an overhead tank, although it may take a few days to do so! These overhead tanks are equipped with alarms for low water level, visual indicators of how full the tank is and have thermostatically controlled heaters to handle sustained colder weather (yes, it does freeze in Mississippi!). The majority of these tanks were obtained as redundant gasoline tanks which were cleaned and mounted on reinforced supports as water weighs more than gasoline.

The tanks are equipped with 10 inch (254 mm) diameter discharge valves and the fire appliances have a 24 x 24 inch (600 x 600 mm) opening at the top of the vehicle tank. These openings have a spring loaded cover which deflects when water is poured from the top but closes if water tries to surge out of the opening due to vehicle movement. The vehicle tanks have a "dump" valve at the rear and/or side of the tank for discharging into the ground level portable tank at a scene. The refilling operation for a 3,500 gallon (13,300 litre) vehicle tank may be achieved using an overhead tank in less than 49 seconds, using one operator who does not even need to leave the ground. This operation is the equivalent of 2,858 gallon/min (10,861 litre/min) hydrant and there are no delays in hooking up and disconnecting supply hoses with the supply valve control being extremely rapid.

Other sources of water, such as ponds, ground level tanks, and streams are available all of which are accessed via dry-hydrants, portable and floating pumps and simple suction hoses.

An adequate and easily obtained water supply is the key to a successful firefighting operation. A little extra investment in hardware, plus some organisation and innovation, as well as the paperwork necessary to document such operations provides for less fire damage as well as providing better fire protection, enhanced firefighter safety as well as providing significantly reduced insurance rates.

A. K. Rosenhan is the Fire Services Coordinator for Oktibbeha County, Mississippi, USA. He is a Fellow in the Institution of Fire Engineers, a Chartered Engineer in the UK, and soes consulting work in fire appliance design, accident and failure analysis.



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Talking Telemetry and future





Tony Pickett

Telemetry is now a frequently heard word in everyday life. It may be telemetry from a Formula One car whilst you're watching the Grand Prix, telemetry being talked about when a rocket launches and sends information back to NASA ground control or even when a probe is launched from the Enterprise during Star Trek. Telemetry technology is also being increasingly used within the fire and rescue service.

Telemetry is usually defined as the automated transmission of data from one point to another. The data is collected from remote or inaccessible locations and sent by wire, radio or other means to a receiving station for monitoring, display and recording. Telemetry has been used for a variety of applications. Some of these include monitoring chemical plants, transmitting meteorological data, gathering flight testing data and for cardiac monitoring in healthcare. The first examples of telemetry appeared in the late 19th

century when data was sent through physical wires, and then later by transmitting data wirelessly over radio waves.

Differences between electronics and telemetry

Breathing apparatus (BA) sets are more commonly being fitted with electronic gauges and you will often hear this described as a set with telemetry. In reality this would not actually be a telemetry system. A true telemetry system would actually

past, present

need to be fitted with a method, most typically a radio module, of transmitting data to a remote point. Therefore not all electronics systems are 'telemetry' but generally all telemetry systems are electronic. For example, if the pressure cylinder gauge is just telling the user what the pressure is, then it is an electronic system rather than a telemetry system. True telemetry sends information back, like air pressure, man down alarm and evacuation acknowledgement.

Telemetry can also be closely linked to accountability, where systems keep track of personnel and their locations and can play a vital role in keeping firefighters safe. Basic accountability systems however do not necessarily use telemetry.

An impact on firefighter safety

During fire and rescue operations telemetry is often used to transmit data to and from individual BA sets to an incident commander or entry control officer to allow for the remote monitoring of these BA sets. The three most common elements of telemetry data that are presently used for the firefighters are man down alarms, air pressure information/monitoring and evacuation signals. These streams of information are used in different ways by the recipient.

1 Man down alarms

Traditionally fire brigades use man down alarms. These are worn by the firefighter and after a period of no movement, activate a loud audible alarm. These alarms are then heard by personnel outside the incident allowing them to know that they have a firefighter in trouble. There is a possibility during the fast paced nature of an incident that these alarms may not necessarily be heard immediately and therefore potential rescue delayed. With telemetry enabled man down alarms then the principle is that, as well as an audible alarm, the man down unit transmits a signal that activates an audible or visual alarm on the entry control officers' (ECO) information system ensuring that the signal is not missed. The benefit with this type of information is the immediacy of the notification which enables a more rapid response to the situation.

2 Air Pressure

Traditionally the entry control officer will base the amount of time that a firefighter should be in a job for on an average estimation of air consumption and therefore a standard calculation of the expected duration of each of the BA sets. With consumption rates dependent on work rates and the type of activity being undertaken, individuals often exceed or are below the consumption rates set within manual calculation tables making it more difficult to manage BA resources safely and effectively.

With modern telemetry systems the air pressure is transmitted back to the entry control point allowing the ECO to know in real time exactly what contents each of the firefighters they are responsible



for have in their cylinders. This takes away the estimation element and allows the ECO to have a better awareness of the situation for every person in their team. For example if the firefighter has been able to conserve air and therefore has stayed in the job longer than the original estimated time then the ECO can see that they have air remaining and would not need to deploy anybody extra into the incident to see if there was a problem.

More sophisticated systems will also take this air pressure information and the users breathing rate (based on measurements taken over the previous minutes) and automatically calculate for the ECO a time of whistle. This time of whistle can be dynamic which means it changes based on the individual's consumption rate of air which will depend on how hard the firefighter is having to work. If the firefighter is still in the incident when their end of service life alarm goes off then that alarm is sent to the ECO as well.

3 Evacuation signals

The third element is that telemetry provides the incident commander or entry control officer the ability to evacuate their wearers at the push of a button. Traditionally evacuation is done by different methods depending upon where in the world you are, for example in some areas three blasts on a whistle, a loud horn, or communication via the radio and voice messages.

Telemetry systems allow the ECO to instantly communicate with the BA wearers both selectively or en-masse and signal to them that they must evacuate. Sophisticated systems also enable the BA users to acknowledge that signal which notifies the ECO that they have received and are responding to their alert.

TELEMETRY



Inbuilt into many systems is also the ability to store and analyse this transmitted data, for example the systems will log data such when a fire-fighter is accepted onto the system as they enter the incident and become the responsibility of the ECO, when they go into alarm and when the ECO has responded to that signal. This data can then be used for later analysis and incorporation into reports. Some systems will even output that data into a standardised report form that will enable the officers to compile and submit their incident records in a much more time efficient manner.

Telemetry across the World

Currently telemetry systems vary between countries, both in terms of their prominence, their appreciation, their form and how they are used. For example, the US uses telemetry systems in which the displays for the control officer are mainly computer-based, whereas in the UK a tally board system is primarily used.

In general users in the US have a positive attitude towards telemetry and appreciate the benefits it can offer. As with any new technology, adoption starts off slowly and gathers pace as the benefits of the systems become more recognised and valued. Similarly within Europe, the usage of telemetry varies greatly, with some countries being more progressive than others. In terms of ECO displays some European countries use computers; others prefer a simpler device similar to a pager or methods such as an electronic tally board. The UK brigades are arguably the leaders in telemetry usage as the take up is much more advanced (approximately 40% use telemetry systems) so as a result proportionately there are more telemetry systems in the UK than anywhere else in Europe. This is possibly because of the formalised entry control procedures employed by the UK fire services which enable the benefits of telemetry to be easily incorporated and realised within its structure.

Recognising the different attitudes towards telemetry, manufacturers are driving telemetry development to suit different markets and to meet user demand and capabilities, including simple pagers, tally boards and computer based systems.

The future of telemetry: location technology
With 40% of the UK fire and rescue service.

With 40% of the UK fire and rescue services using telemetry systems and less across Europe and the States, there is plenty of room for growth in this market. As technology becomes more sophisticated, fire services are realising the true potential of telemetry systems. As a result, one of the key areas for development is the use of intelligent location technology combining telemetry and accountability. For example, building plans (such as hospitals, stadiums and factories) are becoming increasingly available which, when loaded onto mobile data terminals, could in the future allow the control officer to track a firefighter's location remotely, accurately and in real time. With so many benefits customers across the world are asking for it despite the technology being in its infancy. The process to ensure that the technology is reliable and robust enough for service use would be a complex one, however it is a process many research groups are activity looking into.

Another area for growth is the ability for firefighters to track each other during fire operations. In the States every Scott Safety Air-Pak is fitted with a Pak-Tracker radio module which is triggered manually or by the activation of the man-down alarm and acts as a beacon allowing a rescue team to locate them in much quicker time.

The future of telemetry: data development

It is also expected that more firefighting equipment will eventually become wireless compatible, so as well as telemetry enabled BA sets, items such as gas detectors and thermal imaging cameras will be able to communicate with each other and provide the ECO with further information. With thermal imaging cameras this means that the information is being sent to the control point outside the building, enabling the control officer to see what the firefighter is seeing. The gas detectors would also be able to provide and send information so that control officers could better monitor the atmosphere and see any changes that were happening as well as the individual firefighter.

The future in action

Discussions are often had where end users question whether voice radios can be used to send SCBA information. Recently Scott Safety and Motorola Solutions announced a product development agreement to enhance firefighter safety and accountability in the States. Central to this agreement is the capability to transmit critical Scott Air-Pak Self Contained Breathing Apparatus data, such as air levels and PASS (man down) alarm data, over Motorola APXTM Project 25 portable radios. The agreement is a fundamental step towards providing better integration of fire ground equipment within the communications and accountability sector.

When you look back at the origins of telemetry in the fire service, it is quite astonishing the progress made since the original telemetry enabled 'man down alarms' were first released. Over the coming years that progress will continue and equipment will be developed that further improves the safety of first responders and will provide capabilities that would currently be thought of as something that you may only see in a Science fiction film.

Tony Pickett is Global
Product Manager at Scott
Safety. Tony has worked in
Product Management at
Scott Safety for over 18 years
primarily focusing on the Air
Supplied range, which
includes SCBA, Escape sets
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DST-3P4	5.5	14885	18", 4-Blade	81 lbs.	23" X 23" X 21.5"
DDST-3P4	5.5	14885	18", 4-Blade	82 lbs.	23" X 23" X 21.5"
DST-3P4-L*	5.5	14885	18", 4-Blade	85 lbs.	23" X 23" X 21.5"
DST-3P4-6.5	6.5	17000	18", 4-Blade	91 lbs.	23" X 23" X 21.5"
DST-9P4	9	17500	20", 4-Blade	115 lbs.	26" X 23" X 21"
DST-13	13	22000	24", 4-Blade	136 lbs.	30" X 28" X 24"

ELECTRIC MODELS

Model	HP (Output (CFM)	Prop Size	Weight	Dimensions
E18SP	2	12000	18", 2-Blade	85 lbs.	21" X 21" X 18"
E18P4	5	22000	18", 4-Blade	88 lbs.	23" X 23" X 16"
EB18SP	1.25	12000	18", 2-Blade	90 lbs.	21" X 21" X 19"
EX18SP	2	12000	18", 2-Blade	110 lbs.	21" X 21" X 18"

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CPR & AED – Saving sudden cardiac arr



Sudden cardiac arrests (SCA) can be fatal but since the introduction of Cardiopulmonary Resuscitation (CPR) and Automatic External Defibrillators (AED) thousands of lives have been saved worldwide. Laerdal Medical, the company that created Resusci Anne, the world's most famous life-sized resuscitation manikin looks at the evolution of cardiopulmonary resuscitation and automatic external defibrillators and outlines how firefighters in the USA and the UK are using both in their working lives.

Helen Crofts-Bolster

Incidence of SCA and treatment procedures

According to the American Heart Association nearly 383,000 out-of-hospital SCAs occur annually.1

In the UK approximately 30,000 people suffer a cardiac arrest outside hospital and are treated by emergency medical services (EMS) each year.²

SCA is an abrupt loss of pulse and consciousness caused by an unexpected failure in the heart's ability to effectively pump blood to the brain and around the body. It is usually caused by

life-threatening arrhythmias, abnormalities in the heart's electrical system. The SCA victim first loses his or her pulse, then consciousness and finally the ability to breathe. In a cardiac arrest, the heart simply loses its normal rhythm and can go into ventricular fibrillation (VF) which can happen in a few seconds. Without immediate treatment, 90-95 % of SCA victims will die.³

CPR is the most effective method of keeping a victim of cardiac arrest alive long enough for treatment to be delivered. However, the only definitive treatment for SCA is defibrillation – an electric current that 'shocks' the heart so that a normal rhythm may resume. On average, less than 8% of

people who experience an out-of-hospital cardiac arrest survive. However, survival from a SCA can be greatly improved if a bystander has access to an AED quickly⁴. If a shock from a defibrillator is passed through the heart within 2-3 minutes, the patient's chances of survival will be increased by over 50%.

As the practice of CPR and defibrillation didn't occur overnight, it's worth taking a look at their origins to understand current practices and outline how firefighters, as first responders use CPR and defibrillation to save lives on both sides of the Atlantic.

Background to CPR

It may be surprising to learn that CPR is a young science. It was only in 1956 that US Chiefs of Anesthesiology, Dr. Peter Safar and Dr. James Elam conducted research studies, which confirmed that life-saving resuscitation could be performed with expired air by mouth-to-mouth ventilations. The problem that lay in its application was how to train people in this skill as the situation only arose as a dire life-threatening emergency and not at a time of practical training by the uninitiated.

In 1958, Dr. Peter Safar presented his findings at a conference of Scandinavian anaesthesiologists

lives, fighting ests

in Gausdal, Norway, also attended by Bjorn Lind from Stavanger Hospital (Laerdal's home town). Aware of the difficulties of training this mouth-tomouth skill, it struck Lind that Stavanger's own publisher and toymaker, Asmund Laerdal, should go to the US to meet with Safar to discuss the making of a manikin. Following the 1958 conference, the resuscitation debate quickly gathered momentum and the next significant milestone came from Dr. James Jude, Dr. Guy Knickerbox and Dr. William Kouwenhoven in the US, who discovered that external chest compressions could provide circulation of blood to the brain when the heart stopped beating, and increase greatly the possibility of revival.

Laerdal applied all his efforts to the making of a complete CPR training manikin for use to practice artificial ventilation and external chest compressions. The result was Resusci Anne. Her story is inextricably linked to the birth of modern resuscitation and her legacy continues to inspire Laerdal Medical's mission of 'helping save lives'. To date, it is estimated that 400 million people worldwide have been trained in CPR on this iconic manikin.

Implementation of growing evidence can impact patient outcomes

As time has progressed, CPR practices have not remained stagnant with more and more research showing that the *quality* of CPR delivered to a patient in cardiac arrest has a direct impact on the patient's outcome and his or her quality of life.

In a recent review and meta-analysis of resuscitation research literature, Wallace et al. (2013) demonstrated a strong correlation between survival and compression depth and rate. Research shows that appropriate depth of compression and minimal pre-shock pauses correlate with defibrillation success (Edelson et al. 2006)

In a review of research on the use of CPR feedback devices, Yeung et al. (2009) found that real-time feedback during training improves learning and retention of CPR skills and most importantly, improves performance during actual resuscitations. Evidence suggests CPR performance in actual resuscitations by in-hospital and pre-hospital providers, alike, improves when using real-time feedback as guidance (Abella et al., 2007, Kramer-Johansen, 2006). Boprow et al. (2013) showed that scenario based training with real-time feedback and use of real-time feedback during actual resuscitations was correlated with dramatic increases in CPR quality and survival.

Laerdal continues to set industry standards with the new Resusci Anne QCPR and Resusci Baby QCPR manikins, which now facilitate the means to measure and assess the quality of CPR with meaningful feedback that guides continuous improvement and retention of this critical skill. These three values now define the range of Laerdal's CPR training and therapy solutions and the company's commitment to support all healthcare profes-



sionals who work in the field of resuscitation and non-clinical personnel who may witness a SCA.

Background to AEDs

Even though the effect of electricity on muscle tissue was known in the eighteenth century its benefits to the human heart weren't discovered until much later. The first successful (open) human defibrillation was performed by Claude Beck in 1947 on a 14 year old boy who went into VF during surgery. It took until 1979 before the first portable AED was developed.

AEDs are lightweight, portable devices that deliver an electric shock through the chest to the heart and are easy to operate for someone with no medical background. The shock from an AED can stop irregular rhythm and allow a normal rhythm to resume in a heart during a SCA. Modern AEDs are small, compact machines that automatically analyse the casualty via special pads stuck to their chest. The AED will advise on suitable action through easy to follow voice prompts. If the pads are applied to someone who is not in cardiac arrest the AED will recognise the electrical rhythm and prevent a shock from being administered.

Time to first shock is the most important factor to consider in order to improve the chances of recovering from a SCA. With this in mind, the long standing partnership between Laerdal and Philips has resulted in innovative solutions to improve the outcome for the SCA patient by supporting the emergency responder and general public with easy-to-use defibrillators that harness both companies' respective expertise in quality CPR delivery

- ¹ American Heart Association website CPR statistics
- Resuscitation Guidelines2010, Resuscitation Council
- ³ http://www.suddencardiac arrest.co.uk/sudden-cardiacarrest/index.htm
- ⁴ Centers for Disease Control and Prevention 'A Summary of Public Access Defibrillation Laws, United States, 2010' http://www.cdc.gov/pcd/issue s/2012/11_0196.htm

CPR & AED

and 'Quick Shock' technology. Philips' FRX and FR3 defibrillators have been designed to significantly reduce deployment time by eliminating steps to help start the delivery of the right therapy, CPR or defibrillation and are familiar equipment on fire engines globally.

Use of AEDs in the United States

In the United States, all 50 states and the District of Columbia now include using an AED as part of their Good Samaritan laws. The Cardiac Arrest Survival Act of 2000 encourages placement of AEDs in federal buildings and ensures federal liability protection for those who acquire or use an AED to help save a life. In addition, this act provides limited immunity to persons using an AED and the purchaser of an AED. These acts vary by state, but generally, they limit the liability of rescuers using AEDs and others involved in the AED programme.⁵

US Firefighters

The fire service has formally been part of the 911 emergency care delivery system since

EMS began in the late 1960's. Many of the original pre-hospital EMS providers were firefighters, who had 'special' additional training to provide medical services during emergencies that occurred outside the hospital.⁶

Of the 200 largest cities in the United States, 97% have fire service-based pre-hospital 911 emergency medical response. According to the IAFF/IAFC Fire Operations Survey in 2005 the fire service provides advanced life support (ALS) response and care in 90% of the 30 most populated U.S. jurisdictions.

All firefighters in the United States are trained in CPR and a great many fire engines carry AEDs.⁷

Use of AEDs in United Kingdom

Both the British Heart Foundation (BHF) and the Resuscitation Council of UK (RCUK) recommend the use of AEDs and are working very hard to promote greater access for the general public. But their use is still not as prevalent in the UK as it is in America. One reason for this is because there is no mandatory requirement to locate AEDs in public places unlike the US where several states require AEDs to be placed in schools, health clubs, day care centres, places of public assembly and swimming pools⁸. Another reason cited by Dr Andrew Lockey of RCUK is that "people in this country don't know how to do CPR and the most common reason why people don't do anything is the fear of doing harm."

But through public awareness campaigns such as the BHF 'Hands-Only CPR' TV campaign and RCUK's free Lifesaver interactive film (www.life-saver.org.uk) and apps for mobiles and tablets, people are becoming more confident in CPR and using AEDs in the UK.

UK Firefighters

The UK fire service is currently in a time of change, reflected in a report published in May 2013 entitled 'FACING THE FUTURE: Findings from the review of efficiencies and operations in fire and rescue authorities in England' by Sir Ken Knight.

In the report, Sir Knight has recommended that changes could be made at the national level to enable greater collaboration with other blue-light



Laerdal's Little Annie Training System

services, including through shared governance, coworking and co-location and these would unlock further savings.

It is interesting to note this report echoes what was previously stated in a Government White Paper on the fire service in June 2003. The White Paper stated; 'Public services usually work best when they work together. In dealing with emergencies, the public rightly expects the police, fire and ambulance services to work closely with each other and with other agencies. For example, the Government wants to see co-responder partnerships developed and implemented more widely. Under these arrangements, fire fighters, when they are the first on the scene at an emergency, are trained and able to use basic life-support skills, including the use of automated defibrillators, to keep casualties alive until professional medical assistance arrives'. 10

But there is still no statutory requirement for the UK fire services to carry AEDs. However some fire services have placed AEDs on board fire vehicles and this is becoming increasingly prevalent. For example prior to the terrorist bombings in London on 7th July 2005, the London Fire Brigade had started reviewing its first aid kits, procedures and training and was considering carrying AEDs. After the bombings it was decided that every fire engine in London would be equipped with defibrillators. Now all London firefighters have been trained to use the equipment so they can treat people when they are the first emergency service to arrive at a scene, or when patients are hard to reach.

It is still the case though that the core competency of the fire service in the UK is on rescue. Compare this to the ambulance service where its expertise has evolved in treating medical emergencies with trained paramedics/EMTs on board emergency vehicles. In the UK if someone is suffering from a heart attack or suspected cardiac arrest, an ambulance will be despatched.

Firefighters in the U.S. are first responders to medical emergencies, including cardiac arrests. US firefighters comprise the basic emergency response infrastructure for all hazards, including medical emergencies.

US firefighters and their counterparts in the UK have always been and remain at the forefront of saving lives. Their expertise in treating SCA is like CPR and AEDs, evolving to the betterment of citizens in both countries.

⁵ AED Implementation Guide, American Heart Association 2012

⁶ Prehospital 9-1-1 Emergency Medical Response: The role of the United States Fire Service in Delivery and Coordination Whitepaper 2007

⁷ International Association of Fire Fighters

8 AED Implementation Guide, American Heart Association 2012

⁹ http://www.itv.com/news/ 2013-02-07/tonight-how-tosave-a-life/

¹⁰ Our Fire and Rescue Service White Paper June

Helen Crofts-Bolster is

Marketing Manager at Laerdal Medical

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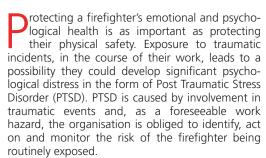


FIREFIGHTER WELFARE



Post Incident Support

The fire and rescue service is one of the first services at the scene of accidents, suicides, acts of violence, acts of nature and major disasters. They retrieve badly injured people and bodies from buildings, road traffic collisions, air accidents and sometimes, this has to be carried out in the context of family and friends standing by watching the horror unfold. They, at times, also have to deal with the people who may have caused death and injury.



Nineteen years ago a member of the former Somerset Fire Brigade¹ committed suicide. At that time there were no measures in place to assist the psychological welfare of personnel in their work and no formalised support for those affected by the death of their colleague.

As a result of this tragic event, myself and a colleague were asked to set up a support service which involved both counselling/treatment and a proactive/responsive intervention aimed at dealing with the impact of traumatic incidents. What has evolved over the last nineteen years, and continues to be open to scrutiny and evaluation and adaption, is a counselling and trauma service that is now part of the culture of Devon and Somerset Fire and Rescue Service (DSFRS).

Post-Traumatic Stress Disorder (PTSD)

Firefighters are a psychologically resilient group who are trained to deal with the extreme nature of their work. It is normal to be temporarily preoccupied with a traumatic incident in some way or to have intrusive memories of it. When this does



Vanessa Davies

¹ The former Somerset Fire and Rescue Service combined with Devon Fire and Rescue Service in 2007.



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not fade or the firefighter does not experience a gradual relief from symptoms then there is a possibility that PTSD may develop.

In 2013 DSFRS attended 112 incidents which met the criteria for being critical (those involving fatalities or potential fatalities). Any one exposed to a traumatic event is vulnerable to PTSD. Firefighters have a different response to *each* call out they respond to. There is little to predict or identify which call will result in PTSD. It can be a cumulative experience or a one-off, hence the need for on-going proactive and reactive support.

PTSD is an awful, debilitating illness that touches every part of a firefighter's life. It not only affects an individual emotionally and behaviourally but has a strong physiological impact as well. Along with the intrusive experiences (nightmares, flashbacks) and the attempts to decrease the distress through avoidance or withdrawal there is the constant hyper arousal/hyper-vigilance of a body that is in alert mode. Each time the memory of the incident is triggered whether by a sight, sound or smell the firefighter is flooded with the sensations they had at the time of witnessing the trauma. The process is exhausting and the firefighter is drawn into engaging in behaviours that halt or minimise the distress whether this be avoiding the triggers or more worryingly easing the feelings through alcohol or other medications.

Reactions to trauma are complex and not easy to predict but research shows that some factors make a firefighter more vulnerable to the risks (low social support and other concurrent stressors such as divorce or bereavement).

So how many firefighters go on to develop PTSD following a traumatic event? In 2009 a joint



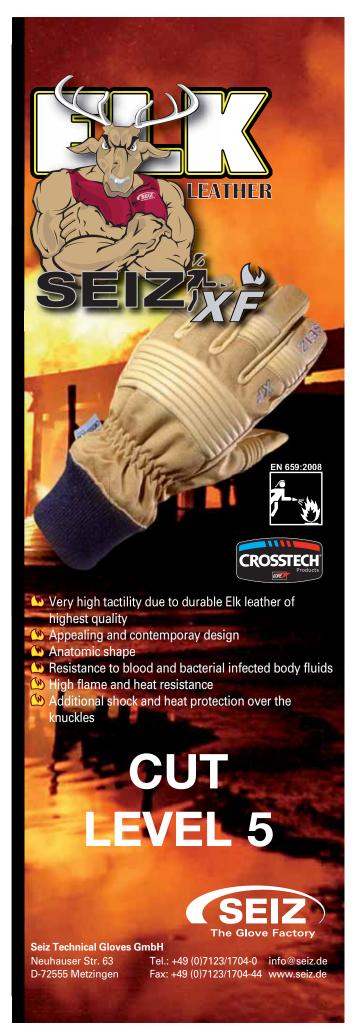
study by the University of Ottawa and the University of Washington focused specifically on PTSD and duty related trauma within fires services in Canada and the US. In Canada 625 firefighters were surveyed. The study found that 1.2% of the Canadian community male population had PTSD while 17.3% of Canadian firefighters were found to have the disorder.

Closer to home, the report 'Psychological Resilience to Stress in Firefighters' (Durkin & Bekerian, 2002) found that in sections of the UK fire and rescue service the incidence of PTSD was around 20%.

In 2013 DSFRS attended 112 incidents which met the criteria for being critical (those involving fatalities or potential fatalities).

Given this level of risk DSFRS utilises a strategic model of crisis intervention that is not a standalone process but one that is linked to pre incident education, peer group 'defusing' meetings, ongoing follow up and monitoring and fast track referrals for psychological treatment.

The aim is to build upon the resilience and coping that is core to a firefighters skills. Understanding what a normal reaction is, what are good coping mechanisms, paying early attention to symptoms, identifying and attending to possible emotional injury to them and that of their



Case Study:

The M5 Motorway Collision

At approximately 2025hrs on November 4th 2011 thirty four vehicles were involved in one of the worst motorway disasters in UK history. The incident occurred on the outskirts of Taunton, Somerset and saw a response of fifteen fire appliances and one hundred and sixty one fire-fighters from DSFRS. The incident resulted in seven people losing their lives and a further fifty one were injured. By the next morning the emergency services had carried out their rescues and the motorway between the junctions remained closed for repair. By 0900hrs the following day the psychological care for those involved had already begun.

All those involved engaged in a peer group meeting on return to their stations. Three days after the tragedy the twelve members of the first crew at the scene were invited to attend a full psychological debrief. A total of two of these debriefs were held, both of which lasted over 4 hours. This decision was made to undertake the debriefs due to the scale and complexity of the incident and the fact that these crews were confronted with the whole incident whereas later attending crews were given direction and specific roles on arrival.

The group meetings were facilitated by an experienced psychological therapist. In addition these firefighters were all contacted by the counselling service and offered immediate 1:1 support of which many took up in the week that followed. They were offered support that met with their individual needs.

All those attending were followed up at 1 week, 1 month and 3 month intervals. A letter was sent out to all involved detailing the support available as well as the support being offered to families.

For most of the firefighters and emergency fire control staff this incident represented an unprecedented episode in their careers. Fire Control staff could see the live feed on television of what they were dealing with while many of those involved expressed disbelief and shock at what had happened and what had been witnessed. It was an ever changing and dangerous environment for those attending which inevitably involved scenes of horror. Despite achieving multiple rescues and engaging in challenging firefighting actions, many expressed the feeling of powerlessness and helplessness in the face of their experiences and a sense of frustration as the scene became more hostile for them to work in

Whether the interventions were effective would require specific research; however a meaningful measure, given the absence of direct psychological measures for all those who attended, would be sickness absence statistics

for the two months following the incident in addition to measuring the number of firefighters who have been diagnosed with PTSD one year post incident. Looking at the statistics available none of the personnel involved took psychological related sick leave in the two months following and at the one year follow-up only thirty three days were lost to stress related illness, although this was not necessarily related to M5 incident.

Through the group meetings, individual sessions and follow ups those involved were able to have the opportunity to hear the collective and individual experiences of experiences that was outside the normal range of critical incidents DSFRS are used to facing. This enabled them to gain vital understanding of what happened, how it was dealt with and how they worked together as a strong and cohesive team in the worst case scenario. From the 61 completed evaluation forms;

- 51 reported the 'helpfulness' of the group meeting to be good or excellent while the remaining 10 found it averagely helpful
- 56 rated the 'overall experience' of the group meeting as good or excellent

In terms of the participants knowledge of PTSD prior to the group meeting twenty rated this as poor or average with this changing to only five reporting they had an average knowledge of PTSD following the meeting.

More importantly when asked to evaluate what they found beneficial many said that it was talking about their experiences with colleagues which they found important;

"Being able to talk about feelings as quite often it is assumed that because we do this job we can cope with anything"

"I found it very beneficial to be able to openly express my feelings and talk about what's had experienced"

And that what they were experiencing was normal:

"It made it clear to me what I think is normal and acceptable"

"It normalised my thoughts and feelings"

And for a lot it provided some sense of closure;

"An opportunity totals about it to the point of closure"

"Having an end to the incident as well as closure"

FIREFIGHTER WELFARE



colleagues and teaching awareness of what support is available is just some of the psychoeducation. DSFRS do not focus on those most at risk following exposure as it has been the experience that firefighters have trained together, worked together, faced trauma together and thus work in crews and therefore intervention need to mirror that. In addition, the aim is to intervene at the beginning. As Durkin said; "Watchful waiting is like telling fire-fighters to stop doing first aid at road accidents and wait and see who gets worse before requesting an ambulance." The aim is to make the psychological intervention a normal part of the culture as the operational debrief or fire investigation.

Following a traumatic incident the crew return to their station with their colleagues to be met by a peer supporter. They then participate in a group meeting that is about psycho-education, group 'story telling' that is combined with practical information aimed at normalising reactions to the traumatic event. It is a psychological first aid response. The peer supporter is also assessing whether a full psychological debrief, carried out by a trained psychological professional is needed. Each meeting is monitored, actions taken outlined, risks noted and follow up organised. The participating group are also sent evaluation forms which assess how prepared for the session they were; the effectiveness of the introduction, the ability of the peer supporter, the firefighters knowledge of PTSD prior to the meeting and afterwards, how helpful the session was and an overall evaluation of the

The peer supporter has undertaken training to equip them with a range of skills to be able to run the meeting, identify those more at risk, carry out a risk assessment, plan follow up and refer to appropriate psychological support. Peer supporters are monitored and supervised as well as expected to attend regular CPD events in order to maintain their expertise.

Providing a Service

One of the most important aspects of providing a service that involves counselling and trauma intervention is that the interventions mirror the values and work of the fire and rescue service and involves being flexible and responsive in meeting the organisations and individual's needs. Our work, like firefighters, is also about prevention and protection served by professionals with a range of specialist skills – anything less would be potentially harmful. The service has to be able to incorporate, the worst case scenario, and act accordingly to respond quickly and effectively to restore psychological well-being as soon as possible so the firefighters can go back to saving lives.

Thus response times have to be good and in my experience when a firefighter requests psychological support they want to be seen as soon as possible. At Hammet Street Consultants, on average, firefighters are seen within three days, however this means that there is a very real threat of the firefighter being involved in another traumatic incident before being seen.

It's important that a service has therapists who are qualified, experienced and have continual supervision and Continual Professional Development to update their skills. Services need to be delivered in line with current guidelines; National Institute for Clinical Excellence, 2005 – Eye Movement Desensitisation and Reprocessing (EMDR) – trauma focused Cognitive Behavioural Therapy (CBT) and if necessary links with other professionals involved in the psychological care of the individual.

Due to the nature of PTSD and the percentage of sufferers who go on to manage their symptoms through substance abuse, alcohol abuse or other addictions it is vitally important to have specialist in this area as part of the team. If they do not have the skills required then they have to have referral routes in place which means the person can be quickly referred to someone who can help.

Vanessa Davies is Director of Hammet Street
Consultants Ltd. She has over 25 years' experience as a Psychological Therapist and in supervising other therapists in areas of trauma therapy and intervention.
Vanessa currently provides therapy and trauma services, in addition to monitoring and training to Devon and Somerset Fire and Rescue Service, UK.

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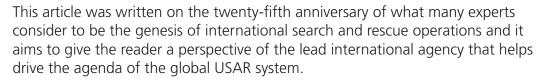




INTERNATIONAL SEARCH & RESCUE



The United Nations Perspective to Search and Rescue





David Dickson



t was on December 7th 1988 that the northern region of Armenia was struck by a magnitude 7.0 earthquake. In a matter of minutes more than 25,000 people had died and the cities of Spitak and Leninakan were reduced to rubble. In the chaotic response that followed, more than 110 countries sent humanitarian aid including medical and search and rescue teams. Much of the aid was not specifically requested; most was uncoordinated both with the Government of Armenia and between responding organisations and agencies.

Following a response that left much to be desired in terms of management and effectiveness, a number of organisations met to discuss how such a response, particularly an initial rescue operation, could be improved. These discussions eventually led to the formation of the International Search and Rescue Advisory Group (INSARAG) [www.insarag.org] and, in turn, to the development of mutually agreed minimum standards for coordinated and principled rescue and relief operations.

Initially comprising of some western European countries, the USA anda few developed countries from the Asia/Pacific region, INSARAG has now

grown to the point where nearly 100 countries and organisations are members of the Group. Membership of INSARAG is open to all countries and/or organisations involved in Urban Search and Rescue (USAR) activities. Countries that plan on receiving USAR assistance if required and countries that plan to build local USAR capacity are as welcome to become INSARAG members, as are countries that already send existing USAR teams overseas.

Since 1988, INSARAG has continuously learned from each disaster that its constituent organisations have attended. Earthquake responses to Turkey, Pakistan, Haiti and, most recently, New Zealand and Japan have been reviewed and the lessons learned have been and are being incorporated into its suite of guidance documents. In 2002, the United Nations General Assembly recognised the valuable work being done and awarded INSARAG its mandate contained within Resolution 57/150. The Resolution is titled, "Strengthening the effectiveness and coordination of international urban search and rescue assistance" and gives INSARAG and its members a clear and unequivocal mandate in their work towards disaster preparedness and response.

INTERNATIONAL SEARCH & RESCUE



A Steering Group comprising members selected from its constituent countries and organisations directs the work of INSARAG. It is supported by a full time Secretariat, which is hosted in the Field Coordination Support Section (FCSS) of the Emergency Services Branch (ESB) of the United Nations Office for the Coordination of Humanitarian Affairs (UN-OCHA) in Geneva. The steering group is made up of representatives from the three regional groups — Americas, Asia/Pacific and Africa/Europe/Middle East. Whilst the Steering Group decide policy, representatives from the international search and rescue team leaders decide on operational procedures and standards.

The major achievementof INSARAG as an organisation is the development and almost universal adoption of a suite of guidance documents and coordination tools that informand assist organisations, and indeed countries, in the prosecution of international rescue and humanitarian relief operations.

The core guidance document is the 'Blue Book' or INSARAG Guidelines, theunderpinning methodology appropriate forall international USAR operations. Adopted 'de facto' by most of the major response organisations, including the European Union Civil Protection Mechanism and the US Federal Emergency Management Agency, the Guidelines set out the roles and responsibilities of countries and organisations, advise as to minimum standards for capability and ensure standardised structures and procedures amongst international USAR teams.

The basic function of the Guidelines is to set the 'minimum standards for international operations', and these standards are expressed in terms of performance and outcomes. Therefore, it is the responsibility of each team to select their equipment, techniques and operating systems as long as these meet the minimum standards required in terms of capability. For example, penetrating through a concrete floor to reach a victim trapped below can be done using a variety of equipment and techniques. The INSARAG Guidelines do not dictate how this should be done, but they do establish the expected parameters of the operation such as specifying concrete dimensions, safety considerations, supervision, logistical and

medical requirements.

The INSARAG Guidelines recognise three levels of USAR capability.

First responders such as firefighters, EMS practioners and members of volunteer groups typically demonstrate:

- USAR Awareness. In the UK, Fire Rescue Service (FRS) crews, paramedics or trained voluntary sector personnel, would represent this level of capability.
- National USAR Teams are usually of Light, Medium or Heavy capability and work with their own national response system. The National Resilience USAR teams are probably the best examples of this within the UK response system.
- International USAR Teams are of Medium or Heavy capability and operate under the principals of self-sufficiency and air mobility whilst adhering to the minimum operational standards stated within the INSARAG Guidelines. In the UK, this level of capability is represented by UK-ISAR, a team created from selected FRS and supported by the Government in the form of the Department for International Development (DFID)

Medium International USAR teams must have the capability to perform all search and rescue evolutions, maintaining continuous operations at one site for the duration of the rescue phase. This would include the capacity to locate trapped victims under debris, provide appropriate medical care, release them and recover them to a place of safety. The team must be capable of being transported by air, whilst also being self-sufficient in every way. Typically, this requires a minimum team of 38 to 40 personnel, including management, logistics, medical and search and rescue specialists.

Heavy International USAR teams must have all the abilities and capabilities of a Medium team and the additional capacity of being able to operate simultaneously at two sites for the duration of the rescue phase. Inevitably, shift operations at two geographically separate sites have significant consequences, requiring a much larger team size. INSARAG Heavy teams typically comprise of 55 to 70 personnel, with a subsequent increase in the amount of equipment required to support search and rescue operations.



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INTERNATIONAL SEARCH & RESCUE



Uniquely amongst international humanitarian relief operations INSARAG provides countries, struck by disaster and needing to request international assistance, a degree of operational assurance. Through a system of peer review, any team within the INSARAG system can be classified as meeting all the requirements of the INSARAG Guidelines, including capability and self sufficiency. Such a system allows countries affected by earthquake, typhoon or tsunami to separate out the many disaster tourists and restrict access to only those teams that are both competent and effective and will work within the accepted humanitarian methodology. So popular and effective has the INSARAG External Classification (IEC) system been proved that other sectors of the humanitarian relief community such as health, water and sanitation are now looking to replicate this system and provide both donors and recipients with some confidence that aid agencies can actually deliver what they claim.

As the reader might remember, I mentioned previously that, in addition to the INSARAG Guidelines, the organisation has been responsible for developing a number of coordination tools and methodologies that guide international rescue operations.

Firstly, the On-Site Operations Coordination Centre (OSOCC) provides a platform for cooperation, coordination and information management among international humanitarian agencies and links into the national response system of the affected country. During a response to any large and complex earthquake the OSOCC is now supported by a dedicated USAR Operations Cell, which coordinates the rescue operations of international teams and provides information and advice to the affected country via the OSOCC structure.

Secondly, the Reception/Departure Centre (RDC) at the entry points into the affected country helps to better coordinate team assignment and logistics support during rescue and relief operations. USAR teams within the INSARAG methodology are required to train personnel to staff an RDC and to support the functions of an OSOCC or USAR Operations Cell.

Finally, the establishment of an on-line hub for real-time information exchange during ongoing emergencies. The Global Disaster Alert and Coordination System (GDACS) [www.gdacs.org] alerts users to an earthquake within minutes of the impact and provides them with an assessment of the likely impact on the local population. GDACS allows also responding INSARAG teams to exchange information and coordinate with each other, with other humanitarian organisations and with the affected country. The positive response from

The positive response from the international humanitarian community to the INSARAG Guidelines and the supporting coordination toolsis highly encouraging and will lead to better coordinated

rescue and relief operations, which in turn, will lead to more lives saved.

Whilst front-line responders working within national systems such as CFOA-led National Resilience programme in the United Kingdom may not immediately appreciate the influence that INSARAG has had on the development of their systems of work and methodologies, such influence has undoubtedly been significant.

The aim of INSARAG is to remain an influence in both international and national USAR operations, ensuring that all countries benefit from the shared knowledge and experience of its members. Significant work has already been done in developing an international 'operational assurance' methodology based on minimum standards, the IEC system. This system will be further refined and may prove a model for some national authorities as they seek to develop and assess their own USAR capabilities. INSARAG, in this era of global recession, is also tackling the matter of the cost effectiveness of USAR response, by looking at how USAR teams can be more widely used in disaster situations. While this means that USAR teams need to be prepared to undertake activities outside of the traditional 'life saving' role, there is already evidence from recent disasters that USAR teams can prove highly effective in supporting communities in the initial recovery phase following a disaster.

Another key challenge for the USAR community is the capture, analysis and effective use of information (sharing). In the age of the smart phone, crowd-sourcing and the cloud, quantity of information about a disaster is no longer an issue, indeed the challenge for responders is to avoid being overwhelmed by information. INSARAG is working with other humanitarian relief organisations to develop shared tools and methodologies that will be available to all and shared by all, so that international and national disaster response continues to improve and develop.

INSARAG has played a pivotal role in the improvements that we have seen in the last 25 years and will continue to play a role in the future development of urban search and rescue.

David Dickson is a Director of Civilience Limited. He was the National Coordinator for the UK International Search & Rescue Team (UK-ISAR) and worked for the UK Government to develop a national urban search and rescue capability in the UK Fire and Rescue Service. He has worked for both the UN and European Union Civil Protection (EUCP) and has considerable experience of the US system of disaster response, working for Texas **Engineering Extension** Service (TEEX) as International Project

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FIRED-uP Project d procurement for fir

FIRED-uP is a three year project investigating innovative ways to reduce the environmental impact of fire service fleets.

In June 2012, London Fire Brigade, UK began work in partnership with the City of Ghent Fire Brigade, Belgium on FIRED-uP. The project won financing under the Competitiveness and Innovation Framework Programme (CIP), which is meeting the staff costs of the project as well as contributing to procurement costs. The CIP is a European Commission (EC) funding source designed to support innovation activities including eco-innovation, to provide better access to finance and deliver business support services across European regions.

The programme offered the Brigades an opportunity to meet some of our wider objectives to reach the market and increase competition while making a positive impact on the environment.

Specifically, the programme is helping us to foster competitiveness including amongst small and medium-sized enterprises (SMEs), and to promote innovation and more sustainable use of resources within our frontline fleets.

Having the opportunity to work with a partner in another brigade in Ghent, Belgium, was an added bonus, as it gave us a chance to gather ideas and share best practices. In addition to the partnership, the EC grant extends the opportunity to hold seminars and workshops with fire and rescue service professionals from across Europe so we have learnt about what other professionals as far apart as Ireland and Poland have done to improve the environmental performance of their fleets.

The EC funded the project with the expectation that we would conduct three main strands of work that could benefit other emergency services across Europe, namely:

- **1** An investigation into innovative market solutions to increase fleet sustainability and reduce the environmental impact of large vehicles
- **2** Guidance on how to manage risk in innovative public procurement
- **3** Conducting one or more actual procurements.

Investigating innovative market solutions

We completed our initial investigations into innovative fleet technologies and processes in early 2013 and used the results of this work to inform the rest of the project. We wanted to identify which technologies can be targeted to bring the biggest gains in improving fleet environmental performance.

This initial investigation allowed us to baseline the performance of our fleets and identify stateof-the-art technologies in the market. This involved internal and external research, formation of an Expert Advisory Group with representatives from other fire and rescue services and the univer-



sity sector, and a workshop in which the potential options were evaluated.

We were also able to showcase the project at larger events such as the Emergency Services Show in the UK, and see demonstrations of new technologies.

The research identified a number of potential technical options that are either new or emerging in the market place and can fit into three broad categories:

- Alternative fuels/propulsion (e.g. biofuels, electric, hybrid-electric, hydrogen)
- Construction and components (e.g. lightweight body, particle filters, pumps, tyres)
- Data, logistics and life-cycle (e.g. on board telematics, eco-driving, vehicle retiring)

It was clear from this investigation that in common with many brigades, LFB and Ghent are already taking some steps to increase the sustainability of our vehicles, such as adopting light weight materials in new vehicles and replacing some of the older environmentally damaging equipment. For example, LFB has begun to adopt rechargeable scene lighting, which takes up less space on the vehicle, reduces weight and increases safety for fire fighters by eliminating the trip hazards associated with cables and petrol driven generators. Research indicated that the market for some of the more familiar environmental technologies such as electric, hybrid or alternative fuel vehicles was too immature for fire service vehicles, would be prohibitively expensive and could not yet meet operational needs. For example electric and hybrid vehicles have a limited battery life, which may not be appropriate for protracted pumping operations.

This led LFB to identify vehicle telematics systems as a promising area for further research and the potential for innovation and Ghent fire brigade to recognise the role which second-line support vehicles may play to reduce environmental impact and increase sustainability.

The market is developing quickly and many fleets have already realised benefits from telematics. LFB has spoken to fleet managers from police and ambulance services who have achieved fuel savings of up to 20%. For LFB, the biggest gains may be from reducing wear-and-tear when vehicles are



Nick Brennan



evelops innovative e services

operated off blue-lights, as well as fuel savings. Other potential benefits include improving maintenance cycles, reducing accidents and a longer life span for components and tyres. Information about pump usage could also contribute to more efficient and effective use of water in fire-fighting.

Guidance on managing risk

A component of the grant funding from the EC is for LFB and Ghent fire brigade to undertake procurement exercises. We are delivering these in parallel and will use the outcomes to provide additional guidance to other public sector procurers on good practices. Some of the issues to be addressed by this guidance include how to get the most out of market consultation, writing specifications which are innovation-friendly, using flexible procedures such as the competitive dialogue and dealing with risk and intellectual property rights.

In LFB's case, we have commenced a procurement exercise to pilot-test data telematics and equipment tagging on a number of front line appliances in 2014. Ghent fire brigade have begun a market consultation exercise to engage with potential suppliers and to debate the technological feasibility and related risks of innovative secondline vehicles.

We are also looking at how to facilitate better market engagement and reduce risk by using mechanisms such as framework agreements. LFB is establishing a framework agreement in several lots which can be used by any other European fire and rescue service or authority. The framework is designed to provide greater flexibility in sourcing telematics and equipment tagging requirements; and allow small and medium-sized operators to compete directly, as they may be in a position to offer value for money for certain system components or services.

The existence of the framework will be publicised under the FIRED-uP project in order to encourage other fire and rescue services to award contracts as appropriate to their needs. This includes Ghent fire brigade and other European brigades who have been following the project, but is also designed to be open to other fire and rescue services currently unaware of the project.

2014 and beyond

In 2014, the FIRED-uP partners will continue to work with other fire and rescue services and suppliers to keep up-to-date with technological innovations in the market place. LFB will undertake the data telematics pilot over a period of six months to collect a wide range of data about the way pumping appliances, ancillary systems and equipment are being used.

This should allow us to track fuel and power consumption, emissions and the use of operational systems and equipment and to identify ways of reducing the cost, burden and amount of maintenance for each vehicle and piece of equipment due to more accurate monitoring of usage. If we



can monitor which vehicular systems do not need to remain on during training and incidents, this could lead to lower fuel use and better power management. This in turn could reduce the high costs and environmental burden of vehicle replacement, by increasing the life span of individual vehicles.

Sophisticated monitoring of the fleet could also reduce the overall number of vehicles by allowing smarter use of reserve vehicles and reduced maintenance events for front-line appliances.

In future, the results of FIRED-uP will contribute to operational objectives for other brigades, for example by analysing vehicle use it may be possible to improve response times by mobilising vehicles more quickly based on location, availability and specialist purposes in a fleet.

LFB is looking forward to understanding how data telematics can contribute to these core objectives of all fire and rescue services, and to sharing this knowledge and procurement capacity with other brigades.

EcoProcura 2014

We will have an opportunity to begin sharing the results in September 2014 when FIRED-uP takes part in EcoProcura 2014 in Ghent (24–26 September). The EcoProcura conference is a European-wide forum to promote exchange and dialogue amongst purchasers from all levels of governments, suppliers, policy-makers and multipliers on strategies and the latest practical solutions on sustainable public procurement and procurement of innovation. LFB and Ghent fire brigade are pleased to be taking part in the conference leading a session dedicated to the project and taking part in a plenary panel. It is hoped that we will also be able to give a demonstration on the progress of the project and undertake a visit to see local fire-fighting facilities and how manufacturers are meeting the challenge of reducing the environmental impact of large vehicles and increasing sustainability.

Nick Brennan is the Project Manager for the FIRED-uP Project

For more information, go to www.fired-up.eu or www.ecoprocura.eu

Addressing the UK a Collaborative Ap





Paul Hedley

The UK is not commonly recognised around the World for experiencing significant wildfires. However, in recent years wildfire has become an important issue locally, regionally and nationally within the UK. This article explains why wildfire is a significant risk and presents examples of some of the partnership work and training that aims to improve prevention, preparedness and response to wildfires.

Recognition of the risk

hile wildfire events in the UK are relatively small in size compared to those experienced in other parts of the World – for instance in the USA, Australia and Canada – they can be very intense, spread over large areas of the landscape and can cause significant costs to the economy and environment.

Historically the UK has been vulnerable to periodic severe wildfire seasons. When these events occur, they can stretch the capacity and resilience of the fire and rescue service. During the last decade, the UK government and the fire and rescue services have begun focusing their efforts on developing safer, more effective and more efficient approaches to managing wildfire risk. The spate of severe wildfire incidents that occurred across many areas of the UK during the Springs of 2011 and 2013 further raised awareness of the potential impact of wildfires which led to the inclusion of wildfire within the UK National Risk Register for the first time in 2013.

Key factors influencing wildfire risk in

The level of wildfire risk is not ubiquitous across the UK, varying considerably across and between different regions. The key factors influencing wildfire risk include the presence of different weather conditions, topographies and fuel types.

While wildfire risk and occurrence in the UK clearly varies according to location, there is also a significant temporal variation caused by the weather and climatic conditions. To provide some specific statistics using a recent data source, there were an average of $\bar{3}74$ outdoor vegetation fires per day during April 2011 compared to 127 per day in September 2011 (Department for Local Government, Fire Statistics: Great Britain 2011 to 2012). Further analysis of fire statistic data indicates that there tend to be two periods of the year when wildfire risk is at its highest and when wildfire incidents are most numerous. The first period usually occurs during the Spring after the winter thaw and before vegetation has begun to grow again. The second period usually occurs during the summer months when temperatures are higher and rainfall is lower. The pronounced temporal variation in wildfire incidents provides its own challenges to the Fire and Rescue Service and is quite unique when compared to the relatively more even distribution of other types of fires and emergency incidents across the year.

Similarly, the varying topography of the UK also has a key influence on wildfire. The upland and more mountainous areas of the UK, which are

's Wildfire Risk: proach

predominantly found in the North and West, provide topographical conditions that are particularly supportive to wildfire spread. Larger wildfires usually occur in upland areas where slopes are steeper and vegetation is more continuous and unbroken, which provides ideal conditions for wildfire spread. A further complication is that many of the fires in the upland areas occur within particularly remote areas where there is a significant delay in any initial attack by the fire and rescue service.

The topography of the South and East of the UK, by comparison, is characterised by more gentle undulating slopes. In direct contrast to the upland areas, the different types of vegetation found in the lowlands are arranged in much smaller contained areas and are less continuous. This relatively discontinuous arrangement of fuel over more gentle slopes creates more "natural" fuel breaks which help to restrict wildfire spread and which provide more opportunities for containment. However, wildfires still occur within the lowlands and their impact can be particularly pronounced because there is a greater likelihood that they will encroach on the rural-urban interface and on key communication links and infrastructure.

The influence of land ownership on wildfire risk

Although the term "wildfire" is used in the UK to refer to vegetation fires, the term is perhaps misleading because there are few truly wild or wildland areas within the UK. The few areas of wilderness that do exist are mostly found in the more remote mountainous areas of Scotland and Wales. Lightning strikes cause a significant number of wildfires in the United States of America and Australia, but they are very rarely an ignition source in the UK. The fact is that most wildfires in the UK are caused accidentally by human activities associated with land ownership and land use; although some areas, like the South Wales Valleys, do experience a disproportionate number of deliberate ignitions.

Government agencies, like the Forestry Commission, Ministry of Defence and the fifteen National Park Authorities, directly own and/or manage large areas of public land, but the majority of land is still privately owned and managed for various purposes connected to commercial farming, forestry, industry and leisure. In some areas of the UK, both public and private land managers use fire as a land management tool to create areas of pasture for sheep grazing. Fire is also used to create different habitats which are necessary for the rearing of game birds for the hunting industry, which is a key element of some upland rural economies. When performed in accordance with the burning codes (for example, the Heather and Grass Burning Code 2007 in England and Wales and the Muirburn Code in Scotland), these prescribed burning activities can be effective for reducing fuel levels and the risk of wildfire. How-



ever, inappropriate prescribed burning practices can actually cause wildfires or increase the risk of future wildfires.

A strong collaborative response to wildfire in the UK

The severe wildfire events that have recently occurred have prompted the UK government, fire and rescue services and a number of stakeholders to work together to more effectively address the wildfire threat within the UK. There is now a widespread belief that the UK fire and rescue services must engage and work closely with other stakeholders in order to find more effective and innovative methods for managing local and national wildfire risk. In response to this realisation, UK fire and rescue services have been working collaboratively with land management partners for a number of years to improve prevention, preparedness and response to wildfires. This work was initially led by a small number of fire and rescue services which had historically suffered from extreme wildfire events.

The collaborative work with rural agencies has been further consolidated and enhanced through the formation of wildfire groups operating at various geographical scales. Two very influential national forums were created during the last decade, with the Scottish Wildfire Forum (SWF) being created in 2004 and the England and Wales Wildfire Forum (EWWF), originally called the England Wildfire Forum, being formed in 2007. Both groups were formed to bring together strategic managers and wildfire specialists from numerous professional sectors to work together to address wildfire issues of national importance.

At a more local level, fire groups have been established to provide a collaborative multi-stake-holder approach to local wildfire issues and to take shared actions and responsibilities to address wildfire risk. These groups are locally controlled and their focus and activities vary according to local circumstances, funding and the stakeholders involved. The creation and success of these groups

WILDFIRE



has been partly dependent upon the presence of champions that have been willing and able to bring together multiple stakeholders and coordinate on-going work programmes. A number of the existing fire groups are well organised and have been very effective at improving partnership working on a number of important wildfire issues. This co-working has encouraged and provided opportunities to solve problems and respond to local issues, often leading to cost savings. Some of the key results have been the development of:

- detailed fire plans providing site specific risk information
- common training systems
- common Standard Operating Procedures (SOPs) and safe systems of work
- collaborative fuel reduction initiatives, such as collaborative burning by fire and rescue services and land managers
- shared resources
- knowledge and information exchange between partners

The success of the early fire groups has since prompted the formation of a number of fire groups across the country.

The adoption of international best practise

In addition to improved partnership working at the local and national level, international collaboration has also made some key contributions to improving the UK's response to wildfire issues. There are several fire and rescue services that have been particularly proactive in actively seeking, forming and maintaining strong international partnerships. These partnerships have provided opportunities for UK fire and rescue services to visit and work with leading wildfire agencies around the World, including those in the USA, South Africa, France and Spain. Personnel involved in these exchanges have shared new ideas, concepts and best practices currently used by wildfire agencies overseas.

These experiences have enabled some fire and rescue services to develop their knowledge, understanding, and expertise which has enabled them to develop and adopt new initiatives that have resulted in further improved wildfire policies, procedures and protocols.

With an improved knowledge and understanding of wildfire among some UK fire and rescue services, it has become necessary to look at how this knowledge and understanding can be shared and standardised among all services in the UK. It was for this reason that the Chief Fire Officers Association (CFOA) Wildfire Group was formed in 2011. The specific purpose of this group is to take a coordinating and leading role in driving new initiatives aimed at raising awareness of wildfire issues, reducing wildfire risk and improving fire and rescue response to wildfires. The group assisted in the development of the first national Wildfire Operational Guidance Manual, which was recently published in October 2013 by the Scottish Government.

Some of the other key achievements of the CFOA Wildfire Group to date have been:

- Assisting with the development of Wildfire National Occupational Standards for the FRS.
- Providing assistance and support to the UK MET Office for the development and implementation of a new Fire Risk Rating System.
- Successful lobbying of the UK national government regarding the inclusion of wildfire within the UK National Risk Register in 2013.
- Development of a Service Level Agreement with the National Fire Protection Association (NFPA) in the USA and the International Association of Fire Chiefs on the use of Firewise materials in the UK to help reduce wildfire risk within urban-interface environments.

CFOA Wildfire Group is currently working with international partners in the development of wildfire training for UK fire fighters and fire officers. To provide a specific example, members of the group are currently working with the Catalonian Graf Bombers in Spain to develop a pilot tactical burning course for UK fire and rescue personnel.

Conclusions

The UK now has the knowledge, skills and expertise required to address its wildfire risk. Many fire and rescue services and their partners are now better prepared for wildfire than they ever have been. However, the need for continued development and improvement is widely acknowledged. The key catalyst for improving awareness and management of wildfire risk in the UK has been partnership working at the local, national and international level. International collaboration has already played a very important part in enabling the UK to significantly improve its approach to managing wildfire risk. Continued collaboration with the international wildfire community is essential if the UK is to continue to improve its approach to wildfire prevention, preparedness and response. Furthermore, it is imperative that the UK continues to form new links and maintain existing partnerships to ensure that it is prepared and able to respond to future wildfire challenges. To this end, the UK is keen and in a position to actively contribute to the further advancement of knowledge and understanding of wildfire by the international wildfire community.

Paul Hedley is Deputy Chief Fire Officer for Northumberland Fire and Rescue Service and Chair of the CFOA Wildfire Group



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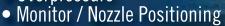
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Exploiting the syner Mariner and Fire Fig Immediate Medical





Perry Simpson

It has long been known that 'Saving Lives at Sea' is the primary purpose of the UK's Royal National Lifeboat Institution (RNLI), working in collaboration with the UK Maritime Coastguard Agency (MCA). One of the tools in its arsenal to achieve this is the unique, ground-breaking and award-winning pre-hospital medical training package – RNLI Casualty Care, colloquially known as 'Big Sick – Little Sick'.

he RNLI Casualty Care qualification is recognised at Level 3 of the UK Search and Rescue (SAR) Operators Medical Group Framework, with medical skills equivalent to an Emergency Medical Technician.

The RNLI course has received the following approvals:

- The College of Paramedics
- The Paramedic Science Degree course at the University of Hertfordshire
- The Anaesthetic Trauma and Critical Care (ATACC) group
- The Royal College of Surgeons (Edinburgh)

The creator, Paul Savage – 'RNLI Clinical Operations Manager' has just been awarded an OBE in this year's 'New Year's Honours List', in recognition of his services in designing this whole approach that has revolutionised UK Maritime Safety.

When your organisation is made up of around 95% mixed ability volunteers, drawn from all walks of life, training is vital, but the time to train volunteers can be extremely limited. It is this challenge that the RNLI is blessed with every day. In this new century, it is not broadly known, that less than 1 in 10 of the organisation's volunteer Lifeboat crew come from a professional maritime background. Excepting the Coxswain and the Mechanic, all the crew have regular day jobs,

responding to incidents on demand via a pager system. One aspect that makes the RNLI Casualty Care course so unique is the ability to take their lifesaving volunteers, very often with little or no prior experience in medical training, to a level of functionality comparable with that of an NHS ambulance technician. The surprise is this is reached in just three days!

How has the charity achieved this? Well, knowing that time is a critical factor, both during training and during lifesaving, and recognising, importantly, that most of their volunteer crew are kinaesthetic learners, the RNLI has developed a training course that removes the complex anatomy and physiology normally associated with medical training, and strips it back to what is essential to keeping the casualty alive until they are handed across to the medical professionals.

Centred around a detailed patient assessment and a set of protocols, all mapped out on water-proof Check Cards, the need for long term memory is removed, therefore reducing skill fade levels. This is backed up with the blended resources of the Course Manual and Medical Scenario Cards, which all interlink with the individual's Check Cards. It is recognised that this is the only course in Europe to have this total blended approach of fully interlinked resources spanning treatment to training.

gies between hter with bespoke Care training

The beauty of this training is its simplicity. More often than not, medical courses are heavy with theory that is not always directly beneficial to the casualty and can be confusing for the student. With the RNLI training course, the theory is kept to a minimum and so the student learns by doing, working their way through hands-on training and cleverly constructed scenarios to re-affirm learning. This style frees up course time to allow confident kinaesthetic skills to be gained in high level medical equipment. The RNLI has been delivering its pre-hospital casualty care training course 'Big Sick-Little Sick' to its volunteer Lifeboat crews and Lifeguards for the last five years with stunning results.

Acknowledging the significant contribution this training has provided the RNLI in saving lives – and they have the statistics to back this up – and recognising the ability of this training package to crossover to other lifesaving organisations, the RNLI has decided to open up its doors, giving other organisations the opportunity to hire the services of the RNLI to develop their own bespoke Casualty Care training package.

In drawing a comparison with the Fire and Rescue Services, we recognise that for the Firefighter, fire-fighting is the first priority; for our volunteer Lifeboat crews, Search and Rescue is their primary role. However, both Firefighters and Lifeboat crews must then move seamlessly into immediate medical care of the casualties, once the initial element of danger has been mitigated against (whether that be a fire, the roadside or the sea). The aim being to stabilise the casualty until such time that the medical professionals arrive on scene, thus increasing their chances of survival.

Casualty Care is a vitally important role of the Fire and Rescue Service, protecting a casualty's injuries and improving their chain of survival, allowing the Firefighter to save saveable life. For the Firefighter, once they have utilised their skills and resources to rescue the casualties, they now have to keep them alive; this can be very often conducted in a difficult and dynamic environment. Although Firefighters work closely with the Ambulance Service and aim to hand over the casualties to the medical professionals, the role of the Firefighter is to assist and care for the casualties until such help arrives.

The first Fire and Rescue Service organisation to grasp this opportunity has been Dorset Fire & Rescue Service (DFRS). This development was born out of the strong collaboration between DFRS and RNLI. Recognising the strong correlations between the two different types of lifesaving organisations, the RNLI and DFRS have worked together to convert the 'RNLI Casualty Care' into 'DFRS Casualty Care', a pre-hospital medical training package bespoke for the Fire and Rescue Services.

Although Casualty Care is a specialised field

within the Fire and Rescue Service, this unique and bespoke training prepares the Firefighter to manage the situations that are encountered in hostile working environments during operational incidents. Dave Myers, DFRS Head of Training and Development said:

"The check card system and scenario cards enabled the delivery of a very practical course and continuation training. This is the hands-on training our Firefighters require and can be delivered in a style that suits a range of learning styles – a great balance of practical to theory."

The training and equipment have been designed using the Information Recording System (IRS) data about incident types and casualty injuries. Rich Cole, DFRS Station Training Manager said:

"The mapping of the course to 'Redkite' (electronic training records) means through continuation training, whole time duty Firefighters will no longer need to go on a 3 day refresher course saving time, money and improving staffing levels (over 200 shifts a year in Dorset). Retained duty system staff may still need a 3 yearly refresher, but this has been reduced from 3 days to 1 day. Once again this saves time, money, and improves fire cover by leaving staff available".

The training course focuses on effective handson treatment rather than complex theory or diagnosis. The aim of this training is to simplify the subject matter, in order to allow the Firefighter to safely focus on their core skills, such as Breathing Apparatus and Working at Height. Firefighter, John Powell said:

"From a service point of view, Firefighters have more competencies than ever to remain safe; introducing a system of casualty care that reduces the expectations on the Firefighters skills capacity is very positive. We can deliver a higher level of casualty care while letting the Firefighter concentrate on safety critical aspects of their job like breathing apparatus. This makes a safer Firefighter."

However, when called upon to care for a rescued casualty, which is an increasingly vital element to the Firefighters portfolio of skills; by using the treatment check cards, which are 'fit for purpose'; the Firefighter is empowered to confidently treat casualties to a high standard, both safely and effectively every time.

The same is true for Lifeboat crews when treating casualties on a 'shout'; often carried out in demanding and stressful situations – on the deck of a Lifeboat in a Force 9 gale, or in a flooded home as part of the charity's Flood Rescue Team. Like our Firefighter colleagues, our volunteer Lifeboat crews benefit from a simplified, logical approach to casualty care.

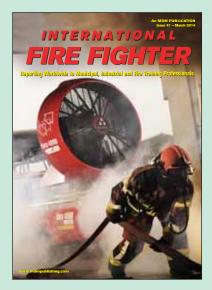
Perry Simpson comes to the RNLI from a military background and has spent the past five years in the RNLI Training teams delivering medical training to the volunteer Lifeboat crews and Lifeguards. In the past year he has moved across to the commercial side, getting the 'Big Sick – Little Sick' product out to like-minded organisations

For more information, go to www.rnli.org

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Dafo Fomtec	IBC
Dr Sthamer Hamburg	43
Dynax Corporation	44
Emergency Services Training Institute (Texas A&M)	82
FDIC 2014	48 & 49
Fire Safety Devices Pvt Ltd	29
Firedos Gmbh	17
Flir Systems	11
Fol-Da-Tank	62
Gielle	27
Groupe Leader	33
Haagen Fire Training Products	61
Holmatro	82
Kussmaul Electronics	14
Magirus	73
Meiko Maschinebau Gmbh	38
One Seven Of Germany Gmbh	41
PAB Akrapovic	30
Pacific Helmets (NZ) Ltd	65
Packexe Smash	55
Paratech Inc	32
PBI Performance Products	85
Pyrolance LLC	76
Quiroga Fire Trucks	23
RHYNO Windshield Cutter	53
RollnRack LLC	61
Rosenbauer International	OBC
Sapphire Complete Training Concepts	85
Savox Communications	19
Seiz Technical Gloves	79
Skedco Inc	9
Solberg Foam	59
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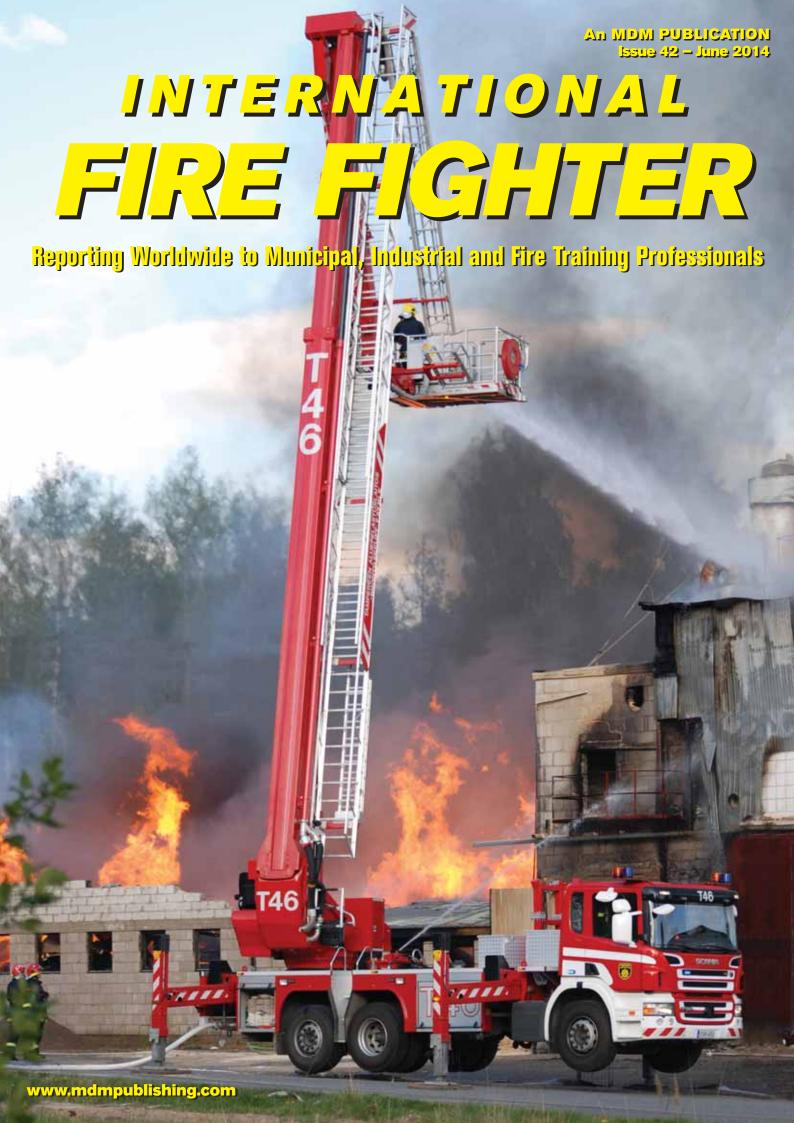
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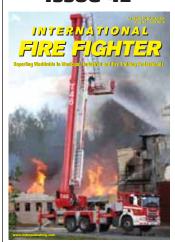
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Bronto Skylift F 37 RLX fighting a factory fire near Tampere, Finland. Photo courtesy of Bronto Skylift.

David Staddon & Mark Seton

Sales Manager Mark Bathard

Contributing Editors

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Contents



6-16 News, Company and Product Profiles 19-22 Foam



Hardware -Understanding the Options **25-29** PPV - Saving lives in the US for more than 40 years 31-35 confined Spaces - a starting point

37-38 True Innovation in the **Firefighting Foam** Industry

40-43 We are here to help you!

44-46 Multi-Purpose Amphibious Vehicles for SAR and Fire **Fighting Operations**

51 Extrication from an overturned vehicle

3-56 Joint working between Aviation and **Municipal Fire and** Rescue Services

58-59 A clearer **Picture**

61-62 Fire Protection of LNG Accets

65-67 An Internal Size-Up

69-75 Responding to wildfire risk in Northumberland (UK): Training and **Partnership Working**

77 Aiding preparedness in the event of a CBRN or major HazMat incident

9-81 Ultra High Pressure - the new (old) tool for fighting fire

83-84 Merino lavs down the challenge

87-90 Anytime, anywhere, anyhow learning

3 4th Annual Fire **Safety Technology** Forum, Abu Dhabi, UAE

94 A working partnership

96 Advertisers' Index





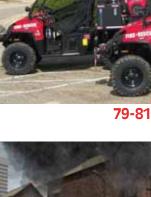




31-35



44-46





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The New Global Standard

in high-performance firefighting foam technology

StormALERT™ high performance foam concentrates for successful extinguishment of Class B flammable liquid fires. An innovation in firefighting foam, StormALERT™ high performance foam concentrates are environmentally sustainable fluorosurfactant and fluoropolymer free products. Formulated using new synthetic foam concentrate technology, StormALERT™ high performance foam concentrates offer rapid knockdown and extinguishment, exceptional burn-back resistance, remarkable flow and rapid resealing characteristics and are designed to replace AFFF and FFFP foam concentrates and older fluoroprotein foams.

StormALERT[™] high performance foam concentrates can be used with fresh, brackish or salt water. Foam discharge devices such as non-aspirating, as well as, aspirating equipment, including standard sprinkler heads, offer optimum performance. Compatible with most dry powder (chemical) agents. Approvals and Listings include UL162 (Standard for Safety for Foam Equipment and Liquid Concentrates), European Standard EN 1568 Part 3 and 4, and International Civil Aviation Organization (ICAO) Level B.

ALERT is an international one-stop source for custom-designed firefighting equipment and foam delivery systems, leading high performance firefighting foam concentrates, state-of-the-art emergency management solutions software, world-class training and proven global Emergency Response and Integrated Risk Management services.









ALERT DISASTER CONTROL

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Dr Harry R. Carter FIFireE, CFO

Harry is President of the United States Branch of the Institution of Fire Engineers. He has enjoyed a 50 year career as fire fighter, fire officer, military officer, author and educator. He currently serves as Chairman of the Board of Fire Commissioners for Fire District #2 in Howell Township, New Jersey.

We Are in the Knowledge Business

any years ago when it was my good fortune to be a fire fighter in the City of Newark, New Jersey, my associates and I spent a great deal of time watching a very popular movie of the time. **Animal House** was the title of this comedy classic. During one of the opening scenes, the camera panned across the front of the statue honouring Emil Faber the founder of the fictitious Faber College. Engraved upon the base of that edifice was a phrase I have adopted as a part of my personal and professional beliefs. That quotation was simple and yet profound – it read, 'Knowledge is Good.'

In our world, my associates and I found that quotation to be profound enough that we went out and created fire company tee shirts with the Engine Company Eleven Maltese cross on the left front of the shirt and the phrase, "Knowledge is Good" emblazoned across the back. It was really good for a few laughs among the boys in the Newark Fire Department. All of this seems like a long-ago trip through the groves of nostalgia. However, I think the lesson of that simple statement has come to stand as a statement of how I have lived my life.

Knowledge has been at the root of many of my endeavours over the past four decades. I have allied myself with groups and organisations which have been created to gather and disseminate knowledge throughout the fire service. Many were the years which were spent working on various technical committees for the National Fire Protection Association (NFPA). In my time I have served as the President of the International Society of Fire Service Instructors (ISFSI), as well as its New Jersey chapter. My research and writing have covered a wide range of topics and issues.

Let me suggest that the capstone to my career in knowledge is my current role as the President of the United State of America Branch of the Institution of Fire Engineers. We are an organisation devoted to the movement of knowledge in many different arenas. It is my intention to share a bit about what the USA Branch is doing to further the cause of knowledge within the fire protection world and its allied engineering disciplines.

This past March our branch held its Annual General Meeting (AGM) in conjunction with the Commission for Public Safety Excellence (CPSE) in Henderson, Nevada. We were most fortunate that Grant Lupton, the International President for the Institution of Fire Engineers, was able to travel from Australia to attend our AGM. He was able to add a true international perspective to our meeting. He was also able to address the CPSE meetings during his time in Nevada.

Perhaps our major branch impact upon the sharing of knowledge within the fire service at the current time is our support and sponsorship for the Vision 20/20 Project which has been underway for a number of years now. A number of years ago one of our members, Ozzie Mirkhah, challenged the branch to work at creating a program to publically support a new range of solutions to the fire

problem in the United States. After a great deal of effort, funding was secured to hold our first Vision 20/20 session in Washington, DC.

IFE Vision 20/20 is an initiative of the Institution of Fire Engineers, US Branch (IFE). The US Branch was established in 1996. Work of IFE Vision 20/20 is led by an Executive Committee and advised by a Steering Committee of organisations and individuals with experience and expertise in all areas of fire prevention.

IFE Vision 20/20 is working to unite efforts toward a comprehensive national strategy for fire prevention. The goal is to focus activities and energy in an effective and collaborative effort to address the fire problem in the United States. Through a national forum that included more than 170 fire and stakeholder organisations, five main strategy areas were identified that represent gaps not currently given adequate attention and that offer the greatest potential benefit to all fire prevention efforts. By focusing national attention on these strategic areas together we can achieve a more fire-safe nation.

This was a watershed moment in our history. A number of people came together from around the country to work on identifying a new approach to the prevention of fire in our nation. As a results of some really dedicated efforts, a series of five strategies were developed to guide our efforts. They are:

Strategy 1: Increase advocacy for fire prevention **Strategy 2:** Conduct a national fire safety education/social marketing campaign

Strategy 3: Raise the importance of fire prevention within the fire service

Strategy 4: Promote technology to enhance fire and life safety

Strategy 5: Refine and improve the application of codes and standards that enhance public and firefighter safety and preserve community assets

Our most recent symposium was held in Baltimore County back in March. It was a tremendous success with nearly 200 attendees from across the fire spectrum in the United States. Friendships were renewed and bridges were built. We believe that we are performing a vital service through our support of this effort.

Another way that the USA Branch is working in the area of knowledge management involves our sponsorship of an international student candidate for attendance at the National Fire Academy in Emmitsburg, Maryland. We strongly believe that the best way to share knowledge involves assisting people in their search for new information and operational methodology. We are pleased to do this and will continue this program into the future.

Let me close this commentary by noting that our branch is in the midst of developing a strategic plan for future operations. It is our goal to insure that we will be able to remain an effective part of the equation here within the American Fire Service. It is a debt which we owe to our members and our predecessors, the people who brought us to the place we hold today. It is my hope to leave the branch just a little better off when I move on.



Armadillo Merino awarded clothing contract

Buckinghamshire Fire and Rescue Service (BFRS) have awarded a contract to Armadillo Merino for the supply of specialist clothing for their Technical Rescue staff. The Service were looking for clothing products which created a head to toe system of protection and which provided maximum comfort and protection to their specialist teams who are required to work for extended periods in arduous and challenging conditions.

Extensive user trials where conducted which took into consideration the following aspects of wearer protection, performance and comfort:

- Moisture management
- Thermo-regulation
- Next-to-skin comfort
- Low odour

It was also recognised that the Armadillo garments offered a higher level of Flame Retardant (FR) protection when compared to the existing next-to-skin clothing issued by the Service.

The clothing selected incorporates the following garments:

- Kojak beanie hat
- Giraffe long neck gaiter
- Panther long sleeve, crew neck top
- Johnnies long john bottoms
- Lightweight boot socks high density, mid calve socks

The garments are all constructed from a special selection of 100% merino wool (except for the socks which have a blend but are 100% wool next-to-skin) to enhance protection and comfort for the wearer. Black was the colour chosen for all garments except for the crew neck tops, of which 225 were supplied in blue and branded with the BFRS crest.

BFRS Chief Fire Officer Mark Jones said, "Buckinghamshire and Milton Keynes Fire Authority were looking for base layer garments which had fewer limitations and challenges than cotton or synthetic materials. Our Technical Rescue staff are part of the national Urban Search and Rescue capability and can therefore be deployed to incidents anywhere in the United Kingdom for extended periods of time. That requires a base layer clothing system that can be adapted to meet the physiological demands that working in challenging environments and differing weather conditions provide. We also wanted a T shirt style top that could be worn at all times when on duty without the need to issue alternatives. After a series of extensive and punishing wearer trials, the Armadillo Merino garments



out-performed the cotton and synthetic alternatives, providing a good solution on the grounds of effectiveness and wearer comfort.

"Whilst there are less expensive

garments available, and money is always tight in this Service, we felt that we needed a greater focus on improving base layer clothing in addition to outer wear PPE. This represents a significant investment to improve the Health, Safety and Welfare of our specialist staff that fits well with our ethos of seeking high quality to achieve best value over time. Andy Caughey from Armadillo Merino has worked closely with us to ensure that everything from the options selected, colours and badging met our requirements and, in seeking to support British Industry, we are pleased to be working with a

UK based company that is growing a worldwide market."

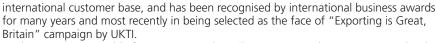
For more information, go to www.armadillomerino.com

FireBug and Angloco Partnership

FireBug Company and their range of innovative WaterMist products are gaining substantial interest across UK Fire and Rescue Services. With an ethos of exceptional products and customer service at all times, FireBug has appointed Angloco as their exclusive sales, service and distribution partners to take the roll-out of products to the next level.

Angloco designs, manufactures and supplies firefighting and rescue vehicles and equipment to the UK and international Fire and Rescue Services. Angloco has a dedicated after-sales service and spare parts department. In addition to carrying out on-location commissioning and training, it has experience in servicing and major refurbishment projects throughout the UK and around the world.

Angloco's reputation for quality, experience, attention to detail, after-sales service and customer care has resulted in an extensive national and



The BacPac, a portable fire suppression kit utilising cutting-edge WaterMist technology is the first of the FireBug of the product range to be rolled out through Angloco, ensuring continued quality assurance to the Fire & Rescue Services. Other FireBug products will follow shortly.

Tom Papenfus, International Sales Director for FireBug said "We look forward to working with Angloco due to their strong national footprint and infrastructure. They have a long-standing reputation of superb delivery, which is in line with our FireBug quality beliefs". Alistair Brown, Sales Director at Angloco commented, "All the team here are hugely excited about working with FireBug and looking forward to taking these innovative products forward".

For more information, go to www.firebuggroup.com



Hong Kong Fire Training Unit

The Hong Kong Fire Services
Department have started operating
a mobile training facility from
HAAGEN, leading manufacturer of
firefighter training products and
complete training systems, a
cooperation partner of the LHD
Group.

By means of the special technology of the Class A fire training facility, situations can be simulated with real flames, extreme heat, high humidity, severely limited visibility and thick smoke without



pollution of the environment. The mobile unit has its own electrical power supply and it is planned to put it into operation at 10 different locations in Hong Kong.

During the exercises, the firefighters wear original LION firefighting suits from the LHD Group in order to train for realistic emergency situations in full gear. The suits were developed specially for the Hong Kong Fire Services Department and, in addition to a high level of freedom of movement and breathability, provide optimum protection for firefighters.

Within the scope of the totalcare contract with the Hong Kong Fire Services Department the LHD Group is responsible for the supply, cleaning and maintenance of more than 13,000 sets of fire fighters clothing for the 6,500 members of the fire service, together with the logistics involved.

For more information, go to www.haagen.com or www.lhd-group.com

Darley – Trusted Worldwide since 1908



Darley has been dedicated to serving the World's fire and emergency services since 1908 and remains a family owned and operated business committed to customer service and its employees.

The corporate headquarters is based in Itasca, Illinois which provides the company over 40,000ft² of space. There is a further 150,000ft² of space dedicated to manufacturing, engineering, research and development operations in Chippewa Falls, Wisconsin and Janesville, Iowa.

Darley's current customer base exceeds 125,000, which includes federal, state and local governments

as well as customers in over 100 countries. Company operations are overseen by the executive committee consisting of James Long, Paul, Jeff and Peter Darley. Paul Darley is President and CEO – Paul has served as President of the Fire Apparatus Manufacturers Association and currently serves on several corporate and charity boards.

The entire company is committed to customer satisfaction and is dedicated to excellence and offer a diverse line of quality products and services through progressive design, manufacturing and distribution. Darley was recently awarded major contracts by the US Department of Defense to provide the armed forces with firefighting, rescue and special operational equipment.

W. S. Darley & Co.'s involvement in the fire industry spans over a century and three generations of Darleys. The company not only have a rock solid reputation for building quality products, but also for building strong relationships with firefighting organisations around the world. Darley draws their strength from being a financially stable company with a unique industry position.

Darley builds fire trucks, manufactures fire pumps and sells firefighting, emergency and defense equipment through its catalogue and websites. Nowhere else will you find a company as dedicated to the fire industry and all this experience comes from a company that cares – W. S. Darley & Co. is customer driven.

For more information, go to www.darley.com



QUICKLAY FIRE ATTACK PRODUCT PROFILE



Sebastian Jacobs

Water on the Fire

From our global interactions with many firefighters from the UK, USA, Middle East, Australia and beyond, there are two main schools of thought – the first being "I don't care about fancy nozzles and techniques, I just want to get lots of water on the fire" and the other, "there's no use getting lots of water on the fire if you don't have well practiced and scientifically proven techniques".

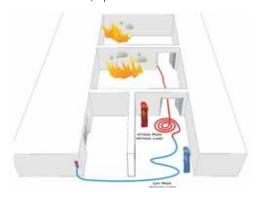
hat's common to both of these approaches is simply 'water on the fire' and no one can argue that this isn't key to a good result when it comes to the task of fire fighting.

It doesn't take many clicks on YouTube to find the arrival and first actions of firefighters being heavily criticised in the comments section. While the language can sometimes be colourful, the underlying message is usually "why did it take so long to get water on the fire?"

The speed and amount of water that gets to the fire or the weight-of-attack is dependent on many variables, with hose management being one of the main contributing factors and one we're interested in at QuickLay Fire Attack.

We have come to the conclusion that common to every incident, be it an oil rig, house or boat fire – there are two standard requirements in regards to managing hose.

These include a need to stretch hose between the water supply and the smoke barrier or fire containment point and the need to deploy enough hose into a coil so the firefighters can advance into the fire without becoming snagged or caught up by excessive friction caused by long lengths of heavy hose laid outside, up or down halls and stairs.



Stretching hose over a distance is a fairly straightforward task, however, under duress and in the dark it can sometimes end up in a mess of hose and not much distance covered.

Straps will hold hose neatly; however, when the bundle is dropped or the load is partly deployed it loses its form and becomes a liability.

With increasing acceptance of the Cleveland Hose Load, also called the "coil or the roundabout" hose load; it is possible to deploy enough hose close to the entry point, so it can be easily advanced into the fire.

However, a hose strapped in the coil can be very temperamental, losing its form if dropped and can also suffer a catastrophic failure should one end inadvertently thread under one loop before the hose is charged.

Furthermore, while 30m/100ft of coiled hose is great, if two thirds of it remains coiled back at the standpipe even before the firefighters are through the door then there's still the issue of dragging a lot of hose.

Purpose built fire hose deployment packs

Following four years of research and development while consulting with firefighters from all over the world we have created a suite of very simple packs that store and deploy hose in such a way that meets these two requirements while at the same time protecting the equipment in storage and transport. In addition, by design the equipment is ergonomic – being long and thin – and fits next to the firefighter's breathing apparatus set, dramatically decreasing the impact of the load on the firefighter's centre of gravity.

Research and Development

Core to our testing was the importance of reliability – not in the drill yard but in limited visibility, high pressure and usually complex situations with gloved hands after a multi-level stair climb.

- Stowage Space is king on a fire engine so an underpinning design intention was to keep things tight and compact while not jeopardising the act of deliberately deploying the equipment.
- Transport 'Bounce' is the term we have used to describe what happens when a piece of equipment is seemingly secured however when carried it bounces and gradually comes loose and starts to hit knees, knock out teeth or cause unnecessary damage to the built environment.
- Deployment As already mentioned, the two packs have very clear roles and subsequently are packed differently so as to achieve their purpose. Critical to the success was the guarantee that all equipment will hold tight, however definitely deploy as and when expected.
- Intuitive design The role of each pack has been made very obvious. The pack that lays from the water supply is blue for water and the pack that deploys close to the entry point is red for fire. While this sounds obvious, it means fire fighters can perform their duties with the discussion being centred on the as-yet unknowns of the incident.
- Implementation To assist with the implementation and skills maintenance we have produced a phone-site (similar to a smartphone app), which will work on all devices so long as they're connected to the Internet. Here we have packing, deployment and application demonstrations. This portal can be accessed at www.qlfanow.com.



QUICKLAY FIRE ATTACK PRODUCT PROFILE

- One size fits all In order to fit all types and sizes of hose, nozzles, dividers/wyes and associated equipment we built in the ability to adjust pockets to fit as required.
- Equipment Depending on many variables, different departments run with different pieces of equipment and to accommodate this we have built in a removable cover for a gated divider/wye.
- Operations While the hose lay requirement is ultimately the same, no two incidents are. It is therefore important that firefighters maximise the capability of their equipment.

Attack Pack

- Can stand up on its side and be held or lent against a wall
- Can be deployed in a platform cage and advanced from within
- Can be deployed then dragged fully in its coils
- Will protect the hose ends from the hose load so as to avoid a thumb/overhand knot forming
- Will not fall apart if dropped
- Can store a coil that is big enough to expand into a kink-free coil yet pack down small enough that it's easy to carry

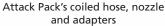
Lay Pack

- Stores a pre-connected gated-wve
- Can be advanced from either end
- Will not lose its form as the hose load lays
- Can be dropped or thrown over a balcony or across a gap
- Can be deployed in a hall way into long flaked lengths

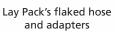
Following this testing we have added a hosesecuring strap and door wedge pockets as well as streamline pockets for other equipment specific to the department.

While the two packs combine to provide what









is easily compartmentalised as a "high-rise kit" they actually combine to form a system to deploy hose in any environment where there's a need for a lot of hose quickly and not a lot of space to do it.

These include courtyards, hallways or even the top landing of aviation rescue stairs.

We are often asked to bolt on entry-tools and even a fire extinguisher and while this would be possible we feel and the general belief is these two packs combine to form a tool specific to the task of rapid and reliable fire hose deployment.

We want to avoid the tool morphing into a lesser performing tool-box with diluted applications.

With this understanding and the purpose designed equipment, firefighters can arrive and intuitively stretch and coil hose with the focus being on the true-unknowns of the job and hopefully get water on the fire fast.

Sebastian Jacobs is an Australian based career Fire Fighter and Managing Director of QuickLay Fire Attack

For more information, go to www. quicklayfireattack.com

Functions	Attack Pack Cleveland/coiled load	Lay Pack Accordion/flaked load	
Can run out when dry (not charged)	No The hose will twist as each loop leaves the bundle resulting in a violent deployment if charged	Yes The hose ends are separate to the hose and as the pack is carried the hose will lay out	
Can deploy right on the spot i.e. fire stairs etc	Yes The nozzle from the coiled hose can be advanced from the coil	No (limited) The accordion lay can be managed in a tight spot however at a cost to time and manpower	
Can advance a full length once charged i.e. fire stairs etc	Yes The coiled hose can be bundled up and dragged up/down stairs or even pulled through doors. Once the hose behind is exhausted, the coiled hose can be advanced	No While it is possible to drag pieces of hose. The time and effort to achieve this is far outweighed by one single fire fighter moving a full length of hose	



Dragon breathes new life

The air crash rescue vehicles of the Magirus range represent a complete new generation of customised Aircraft Rescue and Firefighting Vehicles (ARFF Vehicles) with performances that exceed current ICAO and NFPA requirements. Fire fighters from around the world are very impressed with this newly developed concept. Once again, innovations from Magirus have set new standards for the entire firefighting industry.

In keeping with the Magirus philosophy, this consistent solution has been developed in-house and is made using a 'one-stop shop' approach. The modular structure makes it possible to implement different configurations and drive variants that include a 4x4 on a two-axle chassis, a 6x6 on a three-axle chassis and an 8x8 on a four-axle chassis. These are fitted with single motorisation and Twin Engine Power Pack (TEP) drive



system based on powerful Iveco engines and as a special option can also include a Deutz engine.

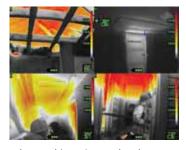
The 6x6 and 8x8 Dragon chassis with a "Twin Engine Power Pack" solution drives the vehicle and the fire pump and results in a better performance than the single engine solution. The two electronically controlled Iveco CURSOR 13 engines

provide a total power of 1,080 HP in Euro 3 or 1,120 HP in Euro 5 version. Iveco Cursor engines have long been known for their exceptional efficiency, light weight and high specific power output.

The success is based on the following strong points: The new driver cab which provides space for 3, 4 or 6 people, four of whom can be wearing breathing apparatus, due to the generous internal dimensions. The driver seat can be positioned on the left, on the right or in the centre of the cab which is a well designed workplace and satisfies all demands for maximum comfort and functionality. The vehicle entry is ergonomically optimised for firefighting operations and large, lowered windows provide all round visibility.

For more information, go to www.magirusgroup.com

UK Fire and Rescue Service selects ISG



Suffolk Fire & Rescue Service (SFRS) are the latest UK fire and rescue service (FRS) to opt for the much sought-after ISG X-Series thermal imaging camera, having recently purchased 54 new units.

The decision to change to ISG's

advanced imaging technology was made by SFRS following a rigorous trial process. The X-Series once again came out on top scoring way ahead of its nearest competitor, as it has done in the majority of FRS trials throughout 2014.

ISG and sales partner Vimpex attribute the successful outcome to not only camera performance, but the unbeatable level of customer support and 48 hour service turnaround they offer.

"We would like to thank Suffolk Fire and Rescue Service for choosing our British made X-380 thermal camera," said ISG Sales Director Andy Slater. "Performance Enhancing Imaging Technology like our Hot and Cold Spot tracking, provide firefighters a level of situational awareness unmatched by any other camera available, this recent trial and subsequent order further demonstrates that brigades' thoroughly testing cameras on their ability to perform are selecting ISG."

Northumberland, Wiltshire, Nottinghamshire, Staffordshire, Tyne & Wear and Bedfordshire are just some of the FRS that have made the decision to purchase the ISG X-380, which is stocked and supplied in the UK by Vimpex Ltd.

For more information, go to www.isgfire.co.uk

The new BIG-Tempest MVU L125

BIG-Tempest is the worldwide leading manufacturer of customised Mobile Ventilation Units with a wide range of products and more than 150 units in service worldwide.

With the new MVU L125 BIG-Tempest is setting the pace in large scale positive pressure ventilation. Equipped with a new reliable and economic Ford engine, reengineered shroud design and an overall improved operator interface the MVU L125



is taking PPV to the next level of ventilating large structures such as industrial manufacturing plants, airports, hospitals, commercial buildings or tunnels.

With a proven effective air flow of up to 1,000000 m³/minute (590,000 cfm) the MVU L125 is the most versatile ventilation unit for a wide range of applications.

The integrated water mist system with a flow of 280 litres/minute (73 gpm) enables the user to cool down fires and objects, knock down gases and vapours or spray water to keep large crowds cool.

An optional ventilation hose kit with non-collapsible ducts is available for effective smoke extraction.

The MVU L125 can do more than just getting smoke out of a building. With a MVU L125 fire departments can pressurise a manufacturing plant or other large structures in case of a fire. This way they can prevent the building and operation from smoke damage. Down times in manufacturing are reduced and the costs of disruption is reduced down to a minimum.

BIG builds the MVU L125 to the customer's needs either on a trailer, chassis or skid unit with a variety of lift, tilt or rotate options. With satisfied customers around the world relying on BIG, with nearly 20 years of experience in manufacturing large scale ventilators engineered and made in Germany.

For more information, go to www.big-tempest.de

One Seven introduce certified fluorine-free foam concentrate

The new One Seven Class B (FF) 1.0% is a fluorine-free and polymer-free, 100% synthetic foam concentrate, which can be used with conventional foam equipment as well as with compressed air foam systems. Due to its advanced formulation it is classified as performance class I and burn-back resistance B according to EN 1568-3 and is therefore suitable for gentle as well as forceful application. In addition to its outstanding extinguishing performance, it is easily biodegradable (>99% in 14 days) and non-toxic for the environment.

As it is not based on polymers it avoids the viscosity problems known from concentrates containing polymers at low temperatures.

In combination with the low proportioning rate of the foam concentrate it is important to ensure the exact dosage is delivered from the foam proportioning system – otherwise the benefits such as lower foam concentrate



consumption and optimal foam quality are lost. One Seven have developed the "OSPi" positive pressure proportioning system. The "OSPi" systems are currently the most intelligent units available in the market - built in accordance with DIN 14430 and available up to a nominal foam concentrate flow of 60 litres/min.

Due to their design the "OSPi" can

handle all types of foam concentrates, including highly viscous alcohol resistant foams. The system automatically adjusts its performance depending on the viscosity of the foam concentrate being used.

They are delivered equipped with a touchscreen operations panel with an integrated PLC (programmable logic controller) which means no calibration is required before use. Differences in the calculated flow will be detected, and the flow will be automatically adjusted by the system. It is a very precise, reliable and safe system. The One Seven proportioning system works very efficiently as it only requires half of the amp draw of conventional proportioning systems. Due to its small dimensions and low weight, the system can be integrated into any appliance.

For more information, go to www.oneseven.com

After Disaster Strikes, **Learning From Adversity**

Join us for the 2014 AFAC and Bushfire & Natural Hazards CRC conference in Wellington, New Zealand, to be held at Shed 6 and TSB Bank Arena, for Australasia's largest emergency services and public safety conference and trade exhibition.

Australasia's pre-eminent emergency management conference takes place from 2-5 September and is designed for delegates with a responsibility for, or involvement in, emergency management. It is the principal gathering of emergency management practitioners, technical experts and researchers in our region.

This year's theme is 'After disaster strikes, learning from adversity'. Natural and man-made disasters strike all countries, but particularly in our region. The conference will give delegates the opportunity to examine how emergency management services, land managers and communities prepare, respond to and assist with disaster recovery, as well as, develop evidence-based policy and practice for the future.

Conference Program:

New Zealand Fire Service Chief Executive and National Commander Paul Baxter officially launched the full speaker program for the 2014 annual conference in Melbourne on 30 April 2014. "It has got everything you could possibly hope for: it's a really exciting program. The conference just continues to develop, going from strength to strength" Mr Baxter said.

This year's program includes 16 leading International and New Zealand speakers, as well as a range of industry experts, together presenting over 90 sessions across the four days. The trade exhibition will then expand on the wisdom of our speakers by showcasing a range of our industry's most innovative products and services.

AFAC Chief Executive Officer Stuart Ellis said this year's conference theme was designed to bring delegates together to share the combined wisdom of experience, research and analysis from across the sector as well as enable a deeper understanding of the approaches needed to secure the region's future and prosperity. For more information, go to

www.afac.com.au/conference

afac C AFTER DISASTER STRIKES EARNING FROM ADVERSITY WELLINGTON 2-5 SEPTEMBER 2014

The Jammer takes **FDIC by storm**

The new improved ABS plastic version of The Jammer was launched at FDIC, Indianapolis in April and proved to be an instant success for products manufacturer, Red Products LLC, whose goal is to distribute assets that can help save

The Jammer is a simple and cost-effective device designed to keep a door from closing. It is a proven and useful tool to prevent doors from closing behind fire fighters when entering unstable environments and preventing them from locking behind you during a search or closing on a hose line.

It is lightweight, so you can carry several in your pocket without adding bulk to your PPE and the high visibility yellow colour makes them easy to see so that you don't leave them behind. To use, simply place The Jammer onto any door hinge and that's it! Unlike traditional door wedges, the design unique design of The Jammer prevents it from coming loose as people come and go through the door.

The new ABS plastic version of The Jammer boasts higher impact and temperature resistance than the earlier version. Originally released in 2011, The Jammer has more than 25,000 pieces in service throughout the emergency services.

For more information, go to www.thejammerusa.com

12

PAB AKRAPOVIĆ COMPANY PROFILE

When conditions are at their worst, we are at our best

Thinking ahead – Devoted to Protection

PAB Akrapović is a family run company specialising in developing and manufacturing high quality protective helmets and body safety gear. It was established in 1953 and has grown considerably over the decades. The Company employ mostly local people who have diverse knowledge and skills with a focus on protective equipment.

van Akrapović was a young engineer with his own vision, passion and enthusiasm for work and new discoveries. In 1953, he founded the company PAB Akrapović and dedicated himself to researching various types of plastic materials. Living in the Croatian region of Istria, where every summer fires destroy the landscape, he recognised the need and the market and soon specialised in developing and producing helmets for firefighters. That and his passion for handcrafted design led to his first helmet in 1978. Keeping in close contact with the special needs of firefighters, the COMPACTA was launched in 1997.

Performance at the highest level and competitive prices have made PAB Akrapović a leader (one of the leading) in the world of professional and semi-professional firefighting. All PAB products conform to EN standards and are produced at the company's facilities in Croatia, Europe.

The goal of the company is to ensure ultimate protection considering the highest standards, best materials and finest technology. All PAB helmets offer top performance in extreme conditions.

Fine design and high technology create the perfect combination dedicated to high performance. Superior fibreglass composites or heat resistant thermoplastic are the guarantee for the ultimate resistance to extreme temperatures and other work or rescue related conditions.

- Double shell technology for stronger impact protection.
- Easily seen by others due to the reflective tape
- Fast release system "push to release" button to quick release interior fitting.
- PAB helmets perform the perfect fusion of function and aesthetics with large field of vision through the visor.

Comfort has also been taken into account by utilising a lightweight shell with ergonomic shape and ventilation system with high Moisture Vapour Transmission Rate (MVTR) level.

With the availability of a wide range of accessories the customer is able to create a high level of personalisation to every helmet.

PAB helmets carry the following certificates: EN 443:2008, EN 397, EN 443:1997, EN 14458:2004, MED Approved, EN 12492, prEN 16471:2013, prEN 16473:2013, EN 166

Safety remains the ultimate goal: the company's know-how translates into safety and resistance,

essential characteristics that enable you to be at your best at every stage of your work. Since its foundation in 1953, PAB Akrapović has remained a family business that invests in research and development, testing and production of a variety of plastic and composite products.

PAB Akrapović has established an advanced laboratory in which specialists and engineers work together. Since the first PAB helmet was launched on the market in 1978 they have specialised in developing premium quality helmets for work and rescue in extreme conditions. The PAB brand has become renowned throughout the world because of the research and constant striving for perfection. This is reflected in each new project.

Advanced technology and carefully chosen materials have allowed our specialists to create state of the art helmets that guarantee the highest standards of safety, providing complete protection and comfort to a large range of professionals.

Our expertise in materials and design results in exceptional helmets that are shock resistant, durable in extreme temperatures and perform exceptionally well in other work or rescue related conditions.

For work and rescue professionals, quality and reliability are principal demands. At PAB Akrapović, everyone shares this vision. At each stage of development, the helmets are submitted for numerous tests. The research team and testing laboratory work together to guarantee optimal use and the highest standard of safety under extreme working conditions.

Our Products

Our range of products covers the needs of a wide range of professionals. With different specifics, certificates and a wide range of accessories, you can choose and customise the most suitable safety helmet for your professional needs.

PAB means total protection for the head, the part of the body most at risk in extreme work conditions. Through the commitment to consistent quality, continuous relationship with the firefighting professionals and remarkable talent in engineering we have become one of the leading edge manufacturers of reliable body safety gear worldwide.

Thanks to the research of our specialists and engineers and constant striving for perfection on each new project, today the PAB brand is renowned the world over, a guarantee of quality in the prevention of work related accidents and injury.

Think a head – We do.





PAB Fire HT 04



PAB Fire Compact



PAB MP1



PAB Compacta



PAB Klassik

For more information, go to www.pab.hr

Bronto Skylift: Above All

Bronto Skylift designs, manufactures and sells truck mounted aerial ladder platforms, hydraulic platforms and water/foam towers to a worldwide customer network. The entire range of products includes approximately 50 different models of aerial appliances designed to be used for rescue and fire fighting and on the other hand for industrial activities such as maintenance, painting, construction work etc.

Bronto Skylift Oy Ab has designed and manufactured aerial ladder platforms and hydraulic platforms for several decades, during which period more than 6500 units have been delivered to fire brigades and industrial customers throughout all continents in more than 130 countries.

Bronto Skylift concentrates exclusively on aerial devices over 30 metres and is currently the market's leading manufacturer of large aerial platforms.

In order to provide effective sales and after-sales on a global basis Bronto Skylift has agents and own regional offices all over the world. Bronto Skylift Skylift has 4 sales companies abroad (Germany, Sweden, Switzerland, USA), plus dealers and agents in around 100 countries.

Bronto Skylift products are designed and launched as ranges, not individual pieces of equipment. The advanced modularity allows countless customer specific variations based on their needs and national regulations.

Bronto Skylift's appliances for rescue and fire fighting cover the rescue heights up to 112 metres. The best sellers are the aerial ladder platforms which have a telescopic boom combined with a ladder and a rescue cage – a concept launched by Bronto Skylift in the 1980's offering extensive outreach and up-and-over capability as well as rescuing with the cage and by the ladder. The ultimate in high rise rescue is Bronto Skylift's range of articulating platforms. This range includes the world's highest truck mounted aerial platform with the rescue height of 112 metres. All units

FILE HEAD



have an integrated waterway. With a remote controlled water monitor, unmanned extinguishing is also possible in case of extensive fires with a danger of explosion. Additionally, with the availability of compressed air, electric powerline, hydraulic pressure, breathing air and the fold-down rescue platform in the cage, it is also extremely valuable for the rescue operations. With the above mentioned power supplies in the cage a wide variety of electric, compressed air and hydraulic power tools can be operated from the cage. Also other means of rescue systems can be used for added operational versatility: rescue chutes, winches etc.

All Bronto Skylift aerial applications can be mounted onto standard truck chassis and can therefore be driven in ordinary traffic. Setting up the equipment at destination does not require special preparations either – even the highest 112 metre unit is up at the destination in few minutes.



For more information, go to www.bronto.fi

Improved Tornado firefighting boot from Rosenbauer

The TORNADO firefighting boot has impressed in the past by providing a good fit and being easy to put on. Now, Rosenbauer has improved the popular boot yet again. The TORNADO NEW now offers new features, particularly regarding safety. The boot is currently being certified for all firefighting and rescue operations (EN 15090:2012 F2A HI3 CI AN SRC).

When it comes to heat or cold insulation as well as slip resistance, the TORNADO NEW meets the requirements of the highest respective protection class, because in an emergency firefighters need to be able to rely on their equipment at all times

Many injuries picked up during fire fighting operations affect the ankle area. For this reason, a layer of ankle protection (AN certified) has been added to both the interior and the exterior of the TORNADO NEW, which offers increased protection from sprained ankles and hazards such as the penetration of sharp objects. The reflective elements below the seam of the trouser leg increase the visibility of operational units. Thanks to the improved sole, the boot is now also SRC certified (slip resistance).

The TORNADO NEW impresses through its exceptional comfort. With its special two-zone lacing, the boot can be tightened to different levels around its shaft and front. The different levels of tightness are fixed with the lace stopper at ankle height. The system allows the TORNADO NEW to fit any foot shape perfectly – regardless of whether the



soft leather used for the flex zones renders

the boot moveable and therefore increases

For more information, go to www.rosenbauer.com

the wearing comfort.

Book Review – Vehicle Extrication Techniques

Holmatro has introduced a brand new 256-page Vehicle Extrication Techniques training book. Written by Holmatro's Rescue Consultant lan Dunbar, the book promotes a safe, methodical and casualty centered approach to the extrication of persons following road traffic accidents. Not only does it cover rescue tools and techniques, it also highlights key medical considerations and quides the rescuer through the



process of efficient extrication planning. All vehicle extrication techniques described in the book are illustrated by pictures and have QR codes referring to videos on YouTube showing how to perform these procedures.

The book is available in English with other language versions planned for later in the year to include German, French, Spanish, Portuguese, Dutch, Chinese, Russian and Arabic. English copies are on sale now and available through a worldwide dealer network at a recommended retail price of €14,95/\$19,95.

Holmatro are currently working on an interactive digital version of the new Vehicle Extrication Techniques training material, which will be published as an app for iPads and Android tablets. In addition, there will be a series of posters explaining and illustrating various techniques and principles. Like the book, the app and posters will become available in multiple languages.

For more information, go to www.holmatro.com



Ruwu Mobile Fans – a rapidly growing brand name

Quality without limits! For decades Rußwurm Ventilatoren GmbH has been delivering customer specific mobile and industrial fans of outstanding quality worldwide and

independent of any sector.
With a brand name which is
well established on the global
market, Johann Russwurm, owner
of Rußwurm Ventilatoren GmbH said, "We
are a company specialising in portable fans



developed specifically for fire brigades".

The company's new developments are especially suited for the fire brigade needs

however; they can be also used for ventilation or additional cooling of machines and compartments.

Low weight, compact design and ease of handling make these high performance fans ideal for fire brigades who must deal with critical situations immediately. They are able to deal with toxic fumes, explosive gases and poisonous steam or provide an immediate fresh air supply in areas where there is little space to operate larger fans.

More and more fire brigades trust the competence of the ruwu solution, rely on "Made in Germany" quality and use such robust and maintenance-free high performance fans.

The RAT – the first Precision Forcible Entry Tool

There are three words in the rescue world that never belonged together before; "Precision Forcible Entry", that was until the Rescue Access Tool (RAT) was introduced into the fire and rescue service.

This versatile tool is the invention of Ed Whittington, a thirty-year veteran firefighter and educator from Rockford, Illinois and high school friend and entrepreneur, Kevin Lohmeier. The tool was designed to assist firefighters with accessing door margins to establish purchase points for hydraulic tools. Once the original prototype was ready, this innovative tool underwent the rigors of emergency response on the drill ground and during incident scene operations. It has been used by hundreds of firefighters and has proven its power and durability.

The RAT has undergone over thirty revisions including thread designs, heat-treating, painting, plating, tool component additions and improvements. Many of these revisions were due to the suggestions of emergency responders and fire service instructors. With the assistance of those visionary responders the RAT has become a high quality, powerful, precision hand tool.

The RAT requires a %" opening to begin operation. The tool is positioned exactly where the responder needs it. Once in place the tool delivers thirteen thousand pounds of spreading power with two hundred pounds of energy applied to the end of the handle, within the first inch of the spiral cone. The vehicle door margins can be spread up to three inches. The RAT has a "stinger" which easily makes holes in the sheet metal of vehicle bodies. These holes can be placed anywhere and may be expanded to three inch openings over hinges, latching mechanisms and other critical areas during extrication operations.

With thirteen thousand pounds of available spreading potential, metal door breaching becomes much easier. A ½"-¾" opening between the door and frame is required to begin operations. This initial opening can be gained using a set of irons. Once RAT operations begins the Halligan bar can be used to hold the position while the RAT is repositioned for multiple lock operations. Most padlocks encountered in the field are no matches for this tool. Farm machinery chain and industrial machinery chain provide little challenge once the RAT gets a bite.

The RAT provides awesome power, precision placement, and ultimate safety during forcible entry and extrication operations.

For more information, go to www.therattool.com

Three different options provide a solution for every purpose

We don't just produce standard devices however, we develop and produce special models individually designed to the client's needs, from the inexpensive MWM 150 E, the ultra-compact entry-level model, to the explosive safe pressure aerator VM 600 D ex with spray adapter.

Thereby, the experienced ruwu engineering team plays a significant role. With expertise, inventiveness and communication skills, the team has developed the most economical solution by working together with the client, which is then implemented in the product.

- Radial design with hose connection
 Where there is a requirement for higher
 pressure the MWM series is ideal as it
 provides for the connection of more
 hoses.
- Axial design with hose connection
 When compact construction
 measurements are required, the axial fans
 of the VL, VM series are recommended.
- Pressure aerator with power
 As the first and only German producer, we have two fan sizes for PPV use by fire brigades in our product range; electric motor and explosive safety in the high performance version.

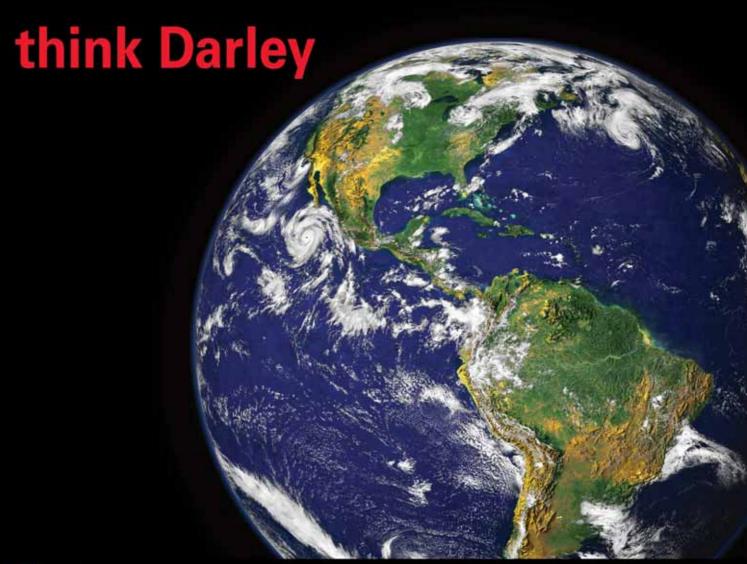
Rußwurm Ventilatoren GmbH offers client oriented service with comprehensive post sales consultation globally.

For more information, go to www.ruwu.de



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- Maximized usage of limited resources
- Low proportioning rates (AFFF foam concentrate class B 0.5% and class B-AR 0.6%, fluorine free class B 1%)
 - resulting in low foam concentrate consumption, reduced logistic efforts
- Low application rates (NFPA 11)
 1.63l/min/m² for hydrocarbons
 2.3l/min/m² for polar solvents
- · Universal extinguishing agent for critical fuels





Keith Klassen

Foam Hardware

- Understanding the Options

Foam is a highly effective tool to include in a fire protection arsenal. It has many applications from fire extinguishment to exposure protection to hazardous material response. In order to make foam effective it is important to both understand how foam systems work and select the correct hardware.

ire safety professionals are familiar with the fire tetrahedron, which graphically demonstrates the elements needed to create a fire. There is also a foam tetrahedron, which describes the components need to create foam. In order to make foam we need water, foam concentrate, air, and agitation. Water and foam concentrate are first combined in the exact percentages required to create foam solution. Foam solution and air are then agitated together to create finished foam bubbles.

Adding foam concentrate to the water is done by a foam proportioner. Adding air and creating agitation can be done by use of an aspirating nozzle. This is called a naturally aspirating foam system (NAFS). It can also be done by use of an air compressor that is used to inject air into the foam solution under pressure. The agitation then takes place in the hose or in a mixing chamber. This is called a compressed air foam system (CAFS).

In this article we will examine each of the foam hardware components, proportioner, nozzles, and compressed air foam systems individually.

Foam Proportioners

There are many foam proportioners on the market today. They range from inline eductors to direct injection systems. Proportioners can be broken into the two broad categories of manual and automatic. Manual proportioners are systems that require user adjustment and/or specific operating parameters in order to function accurately. The most common manual proportioner is the inline eductor. It requires a typical inlet pressure of 14 bar and a specific flow rate, for example 430 litresa-minute. When operating in these parameters it provides an accurate foam solution percentage. Variations outside these parameters will cause inaccuracy or no foam. These units work well for tactical operations where a specific constant flow is required. An example would be a large Class B incident.

The typical fire attack in either the wildland or structural arenas requires a constantly varying fire flow as nozzles are opened and closed and lines are added or deleted. Because of this varying flow an automatic foam proportioner is required. Automatic proportioners will allow for changes in both pressure and flow while automatically adjusting and maintaining an accurate foam solution percentage. There are several categories of automatic proportioners on the market today. They include balanced pressure bladder, balanced pressure pump, and direct injection systems. Balanced

pressure bladder and pump systems both use some method of balancing the foam concentrate and water pressure. The foam concentrate then enters the water stream through a pressure differential valve. As the volume of water flowing through the differential valve increases the pressure differential within the valve increases. This increased pressure differential allows more concentrate to enter the stream and treat the larger volume of water maintaining an accurate percentage.

Direct injection proportioners use a high pressure pump, up to around 28 bar that injects the concentrate into the foam manifold water stream. Parameters such as water flow are monitored and the information is feed to a computer. The computer then calculates the amount of concentrate needed and commands the foam injection pump to add the proper amount of foam concentrate maintaining the correct percentage of foam solution.







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CAFS systems will always use automatic type proportioners and they will typically be the direct injection type. They are sized from approximately 7 litres-a-minute to 55 litres-a-minute of concentrate pumping capacity. Direct injection systems are powered one of two ways; by electric motor or hydraulic motor depending on the size of the system.

Small direct injection systems usually have minimal controls and provide little information to the operator. Controls consist of an on/off switch and a dial to set the percentage. These systems are usually designed only for Class A foam and will proportion between 0.1 percent and 1.0 percent. These systems are also the least expensive. Larger systems will have a digital display on the control unit to provide information to the operator. This information includes current water flow, foam percentage, and volume of water and foam concentrate used. Controls include an on/off switch, a select switch to change the display, and arrow buttons to make adjustments. Percentage rates of 0.1 percent to as high as 10.0 percent are available with both Class A and Class B capability. The larger these systems are the higher the cost.

Every foam capable apparatus should be equipped with a foam tank fill system. This is a convenience, but more a safety feature as it removes the need to climb on top of the apparatus with buckets to refill the foam tank. This reduces exposure to slip and fall hazards. Some of these systems utilise the proportioner pump as the transfer pump to fill the tank. Others utilise a separate independent pump. These transfer pumps are typically in the 23 litres-a-minute range.

Aspirating Foam Nozzles

A method to add air and agitation to the foam solution and create bubbles is to use and aspirating foam nozzle. Aspirating nozzles are a great foam application tool to keep in the firefighting tool box. Air is drawn into the nozzle through a venturi effect. As the foam solution passes through a restriction in the nozzle a low pressure is created that allows the air to enter the nozzle. This process consumes energy; the more air that is drawn in the more energy is consumed.

There are a wide variety of aspirating nozzles on the market. Some are fixed tubes with no adjustment. Others are adjustable usually by changing the stream pattern. And finally, each of the nozzle manufacturers make clip-on aspirating nozzles that attach to the bumper of their fog nozzle to be added when needed.

A term commonly used when referring to aspirating nozzles is expansion ratio. Expansion ratio is the ratio between the volume of foam solution pumped into the nozzle and the volume of finished foam bubbles exiting the nozzle. For example if one litre of foam solution enters the nozzle and 50 litres of bubbles exit the nozzle the expansion ratio is 50 to 1. Expansion ratios are broken into three categories. They are low, medium, and high expansion. Low expansion is from 1 to 1 up to 20 to 1. Medium expansion starts at 20 to 1 and goes up to 200 to 1. High expansion begins at 200 to 1 and can go as high as 1000 to 1.

Low expansion nozzles are typically fixed tubes with no adjustment. They produce a wet foam.



These nozzles typically operate at 5.5 bar to 7 bar nozzle pressure and a class A foam percentage of 0.5 percent.

Medium expansion nozzles are typically adjustable allowing variations in the volume of flow and the consistency of the foam. Operating pressure for these nozzles is typically 4 bar. The lower pressure is necessary because as the bubble size increases the bubbles become more fragile. Too high a pressure will simply break them reducing the effective production of the nozzle. Larger bubbles also require more structure which comes from an increase in foam percentage, usually 0.5 percent to 0.7 percent.

High expansion nozzles produce a large volume of dry foam. The dry consistence is due to the large volume of air and low water content. As the bubbles become even bigger the same principals discussed for medium expansion nozzles apply. Nozzles pressures drop to around 2.7 bar and the foam percentage must be increased to the range of 0.7 percent to 1.0 percent, which is the maximum percentage for class A foams.

Every foam capable apparatus including CAFS equipped rigs should have an adjustable medium expansion nozzle due to its versatility.

Compressed Air Foam Systems

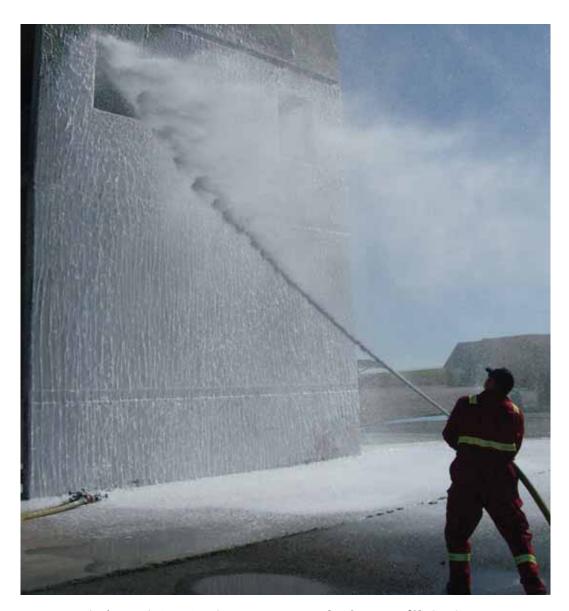
As mentioned earlier, there must be agitation to force the mixing and form the bubbles. The most efficient way to create agitation is a compressed air foam system. In the system, air under pressure is injected into the foam solution as it leaves the discharge of the apparatus. The agitation takes place in a mixing chamber or the fire hose. As the mixture moves through the hose it tumbles and scrubs on the inside liner of the hose creating bubbles. CAFS is capable of producing very fine equally sized bubbles. These bubbles provide the maximum amount of surface area for a given volume of water and therefore the maximum heat absorbing ability.

The simplest way to think of a compressed air foam system is as three separate pumps tied

together. They are a water pump, standard to any pumping fire apparatus; a foam pump or proportioner discussed earlier in the article; and an air pump commonly referred to as the air compressor. In order for these pumps to work properly together there must be check valves to keep the water, concentrate, and air in the proper place. There must also be an auto balance system. Its job is to keep the air and water pressures balanced. This is important as both air and foam solution are being added to the same hose line. If the pressures are not balanced the product with the higher pressure will override and the mixture in the hose will be incorrect. In most systems the air is the last product injected and is added to each individual discharge separately. This is done to provide full control over the foam being produced and to allow individual discharges to operate in different modes at the same time.

Most systems can operate in four modes. They





are water only, foam solution, air only, or compressed air foam. Water can be flowed at any time through discharges not connected to the foam manifold or through foam manifold discharges when the foam proportioner is turned off.

Foam solution can be provided for a standard firefighting or an aspirating nozzle through discharges plumbed off the foam manifold by opening the discharge water valve with the proportioner turned on. Air only can be provided. This is done by closing the discharge water valve and opening the air valve. Compressed air foam is made by opening both the water and air discharge valves. The consistency of the foam can be adjusted simply by controlling the amount the water discharge is opened. The farther the valve is opened the more foam solution will enter the line displacing a portion of the air which is also entering the line.

Recent technical developments in compressed air foam systems have concentrated on making the systems more accurate and user friendly. The use of an auto tank fill device manages the water tank level automatically when the apparatus is hooked to a water supply. They make it easier for the operator of the CAFS to maintain consistent operations.

Nozzles for use with CAFS

In a CAFS, when the foam reaches the nozzle the bubbles are formed and ready to fight fire. The most appropriate nozzle is one that has minimal disruption of the bubble structure. Disruption of the bubble structure returns a portion of the finished product back to foam solution decreasing surface area and fire fighting effectiveness.

Smooth bore nozzles allow the bubbles to be discharged with little disruption and are therefore the weapon of choice for compressed air foam. Selection of a smooth bore nozzle typically includes a valve with a large diameter waterway with a tip which is roughly half of the line size. The smaller orifice size will break a portion of the bubbles removing some air and changing the foam consistency. This combination allows the user to change the foam consistence at the end of the line by simply adding or removing the tip.

With the many foam hardware choices on the market today it is easy to obtain a system that will fit the exact needs. To be certain that you are purchasing the correct system for your needs first determine your target hazards and the tactical applications in which you will use foam. Then research the available systems and determine which will best fit your needs.

Keith Klassen is Instruction Programme Manager at Waterous

For further information, go to www.waterousco.com





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POSITIVE PRESSURE VENTILATION





Woodrow Matthews

PPV - Saving lives in the US for more than 40 years

Positive pressure ventilation is now the mainstay of firefighting departments across the US. As with many innovations, it grew out of a strong firefighting culture in California, a state known for its extensive experience fighting wildfires.

istorically, mechanical ventilation was considered an essential tool for firefighting. Back in the 1950s, firefighters used air blowers to control backfires during wildfires, and in 1960, several large air blowers were used to fight a refinery fire in Santa Fe Springs, CA.

While it was apparent that mechanical ventilation was a powerful firefighting technique, it had limitations when it came to fighting structural fires. At the time, mechanical ventilation meant hanging or holding a smoke ejector inside a structure at a window or other opening to pull smoke out of the building. This was a slow, painstaking process to say the least, increasing the exposure time inside the smoke-filled environment to setup the equipment. Throughout the 1960s and early 1970s, building materials were changing. More plastics meant more toxic vapours and hotter fires, which made it imperative for firefighters to find a way to clear the air more quickly. Smoke ejectors were clearly not up to the job.

Positive Pressure Ventilation Introduced in LA

After constant testing, firefighters in Los Angeles discovered two things: 1) forcing cool, clean air into a structure was more effective than pulling air out of that structure, and 2) placing the blower outside, instead of inside a structure, improved safety and control. It was 1973, and the LA Fire Department coined their discovery "positive pressure ventilation."

This new technique was a boon to firefighter safety. Placing the blower outside the structure and creating positive pressure inside the structure:

- Improved visibility
- Removed smoke and toxins quickly
- Reduced temperatures
- Increased survival rates
- Reduced firefighter exposure to heat
- Reduced property damage from heat
- Allowed attack lines to be deployed to the seat of the fire

POSITIVE PRESSURE VENTILATION

- Decreased fire spread thanks to cooling and rapid confinement
- Controlled post knockdown ventilation more easily
- Reduced flashover risk

But something was still missing. Blowers were placed near the entrance of the structure, blocking firefighters and slowing down rescue operations. Airflow was weak, and materials were vulnerable to heat and smoke damage.

Ballooning helps get PPV off the ground

Meanwhile, ballooning was quite popular in Southern California. It became clear that blowing up these enormous balloons could be a faster, more efficient process. Typically, an operator had to monitor the blowup process, and put up with blowers that vibrated and operated inefficiently.

Enter a balloonist named Don Hamman. He needed a blower that would inflate his enormous hot air balloons without someone holding the fan, so he designed a blower that did just that. Hamman saw the potential for this fan beyond ballooning, as did his grandmother. She heard that a fire department in Bakersfield, CA was experimenting with a firefighting technique they called positive pressure ventilation. Hamman worked with them to adapt his designs to firefighting applications. Now there was a fan with the power and stability to take PPV to the next level.

By the late 1980s, PPV fans were a staple of firefighting in several states, including California,



Utah, Texas, Connecticut, Maryland, and Florida. With the continued popularity of PPV as a fire-fighting strategy, more research in the field yielded improvements and evolution in airflow, materials, and technology.

Air Straightening Technology Increases Fan Setback Distance

In addition to composite blades that proved stronger and more resistant to heat, air straightening became a revolutionary new design in PPV blowers in 2010.

Traditionally, PPV fans produce a spinning airflow. This swirling motion causes the air to quickly spiral outwards, losing its punch after 2 to 3 meters. This tight operating zone has been the norm since PPV was introduced to the fire service. "Move the fan closer," was the mantra, to cover the door with the cone and get the airflow up.





By contrast, air straightening creates a long, straight airstream that can ventilate a building from 2 to 6 metres from the entrance without losing its effectiveness. Think of it as the difference between a fog nozzle and a straight stream nozzle. The fan's stator vanes shape air into a tight, straight beam that pulls in the air along the beam's path as it travels. This focused flow results in high air volumes into a structure while not obstructing access or introducing an excess amount of fan noise into the interior.

Greater setbacks and decreased noise transmission while maintaining high volume flow rates, translate into safer operations, lower noise levels, easier egress and ingress, and more overall flexibility.

Larger Structures Demand Larger Blowers – Enter the LSV

Firefighters worldwide now recognise the practical limit of the normal 45-55 cm truck or engine carried blower. Structures larger than 500 to 1000 m² are difficult to ventilate with such small blowers, especially when the structure is more a voluminous space than a compartmented domicile. When confronted with schools, nursing homes, warehouses and such, the standard PPV blower is not up to the task.

Ranging from 20 hp up to 120 hp and 100,000m³ to 240,000m³ various Large Structure Ventilators (LSV), are being marketed to the fire service with the power needed to address the large structures that are proliferating. These larger fans now give fire departments the ability to apply the advantages of PPV to large structure fires, from high-rises to big box stores and warehouses.

By incorporating air straightening into their design, some of these mobile fans have the ability to reach entrances from as much as 10 or more metres from the ingress. Such setbacks from the entrance are overcoming the limitation of the lack of mobility of earlier designs allowing firefighters to move unimpeded through building entrances. With tilt options or other arrangements, LSVs can be used on multi-story buildings with great success.

Another advantage of LSVs is their mobility. They can be mounted to a trailer, hitched to the back of a truck or mounted directly onto a truck, giving fire departments even more options. Using multiple LSVs at incidents involving large buildings is becoming more common in the US, and prove to be more economical for fire departments on limited budgets than purchasing a single, much larger ventilator. Large structure ventilators are





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- Big box stores and shopping malls
- Subway tunnels
- Warehouses and manufacturing facilities

Reducing Firefighter Exposure to Carbon Monoxide

PPV blowers are predominantly powered by gas engines or electric motors. Electric motors are quiet and carbon monoxide (CO) free, but lack the muscle required for larger structures and, of course, require a generator. Gasoline engines are notorious in exhausting carbon monoxide, which in turn gets carried into a structure. Heavily diluted by the air from the blower, readings of above 50 PPM can be obtained, mostly during training, but also during those times engine speed is reduced. Unfortunately for all, electric motors have a practical deployable limit of 2 hp for the majority of fire apparatus, leaving the larger blowers to be gasoline engine powered.

The US Environmental Protection Agency (EPA) has shown that small internal combustion engines increase pollution-related urban health problems, while government agencies are publishing guidelines, and even regulations, as to the maximum exposure time to CO by all workers, including firefighters. That's why reducing gas engine emissions, especially CO, is crucial for firefighter safety and air quality. In California, manufacturers receive special certification for minimising or eliminating small engine emissions.

In trying to address these market realities and concerns, manufacturers of PPV and LSV equipment are borrowing a page from the auto industry and experimenting with catalytic converters to alleviate the concerns. At full throttle, some of these devices are capable of reducing the CO component of exhaust to a point that it is undetectable inside of the ventilated structure.

Looking ahead with Infrared Thermography

Infrared (IR) thermography, commonly referred to as a TIC (thermal imaging camera), is opening up

another avenue of safety for firefighters. Besides their well documented use in locating victims through smoke and heat, the devices are proving useful in sizing up heat load and heat migration during PPV or more significantly PPA (positive pressure attack) operations.

An important concern during a PPA exercise is to properly locate the egress for the heat and smoke to leave the structure. This is the responsibility of the scene commander to size up the situation and determine the proper location of equipment, personnel, ingress and egress points and to control the sequence of events. Using the TIC as an integral part of the PPA operation, not only can the amount and location of heat be determined, but the dynamic three-dimensional movement of the heat load towards the egress can be visualised and analysed for appropriate cause and effect. Such feedback is vital in insuring firefighter safety as the operation progresses. During training of firefighters, the TIC becomes indispensable for creating a visual image in the mind of the trainee depicting the cause and effect of changing the ventilation variables

Some proven advantages of Infrared thermography include:

- invaluable in the training of firefighters in PPV and PPA techniques
- locate hotspots that may be caused by inappropriate ventilation during overhaul
- view heat patterns to locate centre of fire
- locate trapped individuals more quickly
- save life and property
- identify holes and other obstacles/structural weaknesses

The future of LSV is hot

It's an exciting time for PPV and LSV development. Innovations continue in PPV and LSV design and operations as building techniques change the combustible materials in structure fires. Plastics and other synthetic materials burn hotter and are more toxic, making larger capacity blowers more critical than ever.

Consider that the energy released during combustion of a typical structure and its contents has increased by four-fold in the last 30 years, as the materials we use to produce our fabrics, carpets, furnishings and fixtures have changed from organic materials such as cotton, leather and other natural fibres, to synthetics derived from the magic of the chemical and petrochemical industries. What makes our lives easier complicates that of the firefighting environment.

This creates an ongoing challenge for firefighting industry and its suppliers, including those creating ventilators. How do we maintain outstanding safety records, improve survival rates and remove toxic fumes and smoke quickly? We've got the tools. But the tools will only function at their highest potential if the training is there. The importance of including PPV and LSV operations into every standard operating procedure (SOP) is critical. This can't be emphasized enough.

And that's not just hot air.

Woodrow Matthews is a Certified Fire Instructor and an expert in PPV and thermal imaging. He's an active Fire Captain at the Howell Township District 5 fire station in Monmouth County, New Jersey, USA





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DSTS-3P4-5	5	14800	18", 4-Blade	73 lbs.	22" X 21" X 17"
DST-3P4	5.5	14885	18", 4-Blade	81 lbs.	23" X 23" X 21.5"
DDST-3P4	5.5	14885	18", 4-Blade	82 lbs.	23" X 23" X 21.5"
DST-3P4-L*	5.5	14885	18", 4-Blade	85 lbs.	23" X 23" X 21.5"
DST-3P4-6.5	6.5	17000	18", 4-Blade	91 lbs.	23" X 23" X 21.5"
DST-9P4	9	17500	20", 4-Blade	115 lbs.	26" X 23" X 21"
DST-13	13	22000	24", 4-Blade	136 lbs.	30" X 28" X 24"

ELECTRIC MODELS

Model	HP (Output (CFM)	Prop Size	Weight	Dimensions
E18SP	2	12000	18", 2-Blade	85 lbs.	21" X 21" X 18"
E18P4	5	22000	18", 4-Blade	88 lbs.	23" X 23" X 16"
EB18SP	1.25	12000	18", 2-Blade	90 lbs.	21" X 21" X 19"
EX18SP	2	12000	18", 2-Blade	110 lbs.	21" X 21" X 18"

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Incident involving confined spaces? Most definitely – but why? (Photo: Phil Crook)



Confined Spacesa starting point



Phil Crook

There are many aspects to emergency operations in regard of what equipment and what techniques or systems of work can be employed at incidents involving confined spaces. However, it is important to fully understand the meaning of 'confined space' when it comes to emergency operations. To not do so can result in actions not being taken that could result in a lower level of safety for personnel and casualties and in possible legal action against your department were there to be a situation generating an investigation by regulatory authorities. This would be most relevant at either extended operations where there is time to put in place all appropriate control measures or at incidents where there is no immediate life risk.

onversely, trying to comply with legislation where it is not required can hugely delay rescue operations with obvious and equally serious consequences.

It is therefore paramount for emergency services to examine regulatory documents that affect their operations to produce their own internal policies, procedures, work systems, equipment and training that demonstrate the organisation has assessed the impact on their activities and personnel and reacted to ensure they are in compliance. This provision must be balanced to reflect the fact that, generally, the only reason fire fighters would enter a confined space would be in an attempt to rescue a casualty or for some reason that would prevent a far worse situation developing. Consideration must also be given to the fact that many systems designed for industry may not be suitable for a fire and rescue service (FRS) response as there is not the time to produce detailed risk assessments, emergency plans and permits to work that would be required for non-emergency work. Fairly obviously, until a call is received, FRS personnel will not even know the location at which they will be working let alone any of the other vital information that would be available to industrial teams prior to any work being considered.

From a FRS perspective, it is important to remember that the confined space regulations are not just for emergency operations. There is a vast amount of work undertaken in confined spaces for industrial or commercial purposes – certainly far more than the emergency services would ever get involved with. The regulations and associated good practice give a structure to how that work should be considered and the necessary arrangements that should be put in place if work in confined spaces is to take place.

FRS should plan to comply with any applicable legislation and this should be reflected in their policies, procedures and training. However, in emergency situations where lives may depend on the actions of FRS personnel there is also a need to understand how risk assessment can and should affect the activities of emergency personnel. To be able to make any operational decision that might not be legally compliant in 'normal' working conditions, personnel must fully understand the regulations in question.

Most legislative documents can be extremely hard to decipher into plain language. This can be so difficult that, in certain cases, better understanding is not achieved until specific incidents have been fully examined, investigated and dragged through a protracted legal process that results in 'case law' setting precedent. Much of this type of legislation is generally accompanied by various documents such as 'codes of practice' and independent interpretation by sector experts and industry. The production of these associated guides is generally delayed until examples of practice have been identified; either by the above cited production of precedent or by the accumulated experiences of many agencies via local or national networks. However, elements of this guidance can be biased in ways that will suit the particular organisation producing that interpretation. Consequently, this process can produce working examples of either bad or good practice that can be used as benchmarks in the standards of operations that should be employed for these activities.

It is also important to consider that some activities that have become recognised as good practice at incidents involving confined spaces, whilst not necessarily legally required, should be undertaken wherever possible as they will make difficult scenarios easier to manage. This could include the use of items such as gas monitors, ventilation systems or 'working at height' equipment. Additionally, many systems that are employed during operations involving confined spaces can also be utilised at other types of incident. Again, whilst



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Whilst this would not normally be considered as an incident involving confined spaces; as far as the Confined Space Regulations are concerned – it is! (Photo: Hampshire FRS)

they may not be legally required, their use can make otherwise difficult situations far easier to deal with.

So, returning to the title of this article, the first thing to consider at an incident of this type is whether the situation you have is actually a confined space or not. In the UK, the Confined Spaces Regulations 1997 (CSR) are quite specific about what constitutes a confined space. Whilst this is not the place to regurgitate legislation, some detail from the regulations will assist to show how confusion can be created when trying to interpret the regulations and show how preconceptions will only add to that confusion.

The CSR define a confined space as "any place, including any chamber, tank, vat, silo, pit, trench, pipe, sewer, flue, well or other similar space in which, by virtue of its enclosed nature, there arises a reasonably foreseeable specified risk"

This therefore means there is a need to understand what a specified risk is, to know whether or not a confined space is present. The same regulations define a specified risk as; risk of:

- a. serious injury to any person at work arising from a fire or explosion;
- b. without prejudice to paragraph (a) -
 - the loss of consciousness of any person at work arising from an increase in body temperature;
 - ii. the loss of consciousness or asphyxiation of any person at work arising from gas, fume, vapour or the lack of oxygen;
- c. the drowning of any person at work arising

from an increase in the level of a liquid;

d. the asphyxiation of any person at work arising from a free flowing solid or the inability to reach a respirable environment due to entrapment by a free flowing solid.

Furthermore, as would be appreciated by the reading of these regulations, there is no reference to restricted or difficult access or complex configurations of premises which are, very likely, the most common preconceptions that exist when considering confined spaces.

Many of the risks that are considered most likely to be contributory to problems during emergency operations are not considered at all in the regulations. This is because the regulations only consider those hazards directly associated with confined spaces. The long list of additional problems that arise when entering confined spaces in an emergency are issues that should already have been considered; not only for incidents



involving confined spaces, but also for many other types of emergency scenario. The requirement for the consideration of these issues is generally covered by other regulations.

The latest UK guidance document for working in confined spaces was released in January 2013 which gives good direction on how to comply with the CSR and provides much more detail on procedures and equipment than has previously been available. It has taken almost 17 years to get to this point and the information provides answers to many questions and clears up much confusion that has been identified during that period.

There still remain many differences in the manner with which incidents involving confined spaces are dealt with and whether certain types of incident should even be considered as involving confined spaces. For example; the CSR detail that the risk of injury due to fire or the loss of consciousness of any person at work, arising from an increase in body temperature would constitute that area being a confined space. Therefore, this would mean that every fire a FRS responds to is a confined space. Whilst that is correct, FRS will be satisfied that the control measures and emergency plans that are put in place at these incidents are appropriate for the identified risk.

However, what if that fire was to be on a ship, in a small compartment that had challenging access down several decks? In normal conditions this compartment could be in regular use and in no way be considered a confined space. However, there is no doubt that the degrading of conditions



Not commonly considered as a confined space – it should be. Rescue from situations like this can be very complex. (Photo: Hampshire FRS)

generates risk that would, under the regulations, constitute this as a confined space. What would FRS put in place as the rescue provision for the crews committed to that space?

A part of most rescue systems for confined space entry is ensuring that personnel committed into the space are wearing a harness. Use of harnesses and associated equipment could be

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seen as a crossover from other areas of work, however the wearing of a harness makes the rescue of personnel significantly easier to achieve than would otherwise be the case. How many FRS include the wearing of a harness in their procedures for firefighting in ships? How many have even considered it?

Admittedly, whilst the CSR do require provision for emergencies they do not specifically require a harness for personnel entering confined spaces although their use is referred to in the latest guidance for safe working in confined spaces. Importantly, any rescue provision has to be workable as just by having more personnel available and ready to enter does not, on its own, constitute a viable solution. The example of having personnel wear a harness is one that has developed over time due to it being shown to provide many benefits that support a safer system of work.

Fully understanding the legislation that industry should comply with will:

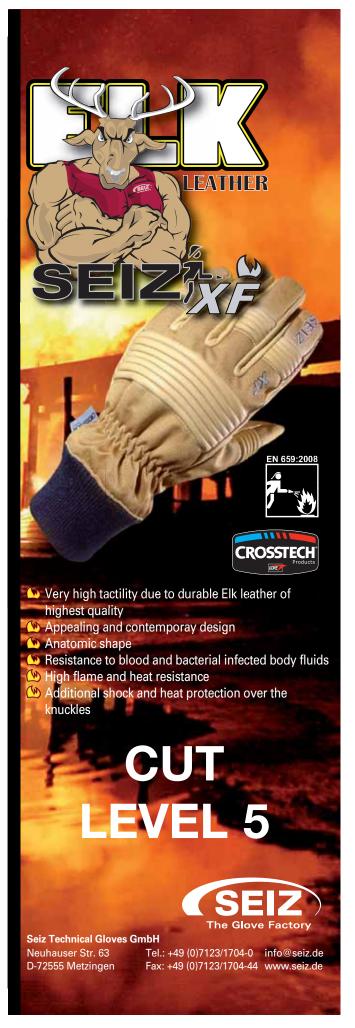
- Ensure that fire and rescue service personnel have safe systems of work and appropriate equipment and training
- Give some indication as to the work systems, types of equipment and levels of training that should be encountered when responding to emergencies
- Allow informed dynamic risk assessment to adapt procedure during emergency operations
- Remove the need for unnecessary delaying actions at incidents
- Allow the continuing development of emergency response to incidents involving confined spaces

However, full compliance with specific legislation is often not enough as so many of these regulations overlap when it comes to responding to emergency situations. It is therefore highly likely that where there is a need to comply with confined space regulations there will also be a requirement to comply with legislation regarding safe working at height and working with hazardous materials. This is just two additional areas of work where there is an obvious and commonly encountered overlap.

Ultimately, if, along with an understanding of relevant regulations, there has been a risk driven examination of the incidents that FRS personnel could foreseeably respond to with the development of appropriate policy, procedure, equipment and training to support that response, it is likely that compliance with legislation will be achieved.

In future articles we will undertake a more specific examination of various techniques and equipment that can be utilised at incidents involving confined spaces. Some will be needed to comply with regulation; others may not be legally required but will, most certainly, be good practice and in many cases applicable to other areas of emergency work.

Phil Crook is a USAR Team Section leader in Hampshire Fire and Rescue Service and a member of the UK Fire Services International Search and Rescue (ISAR) Team. He has been involved in the development of the UK USAR and ISAR capability since its inception having been seconded to National Resilience as Deputy USAR Capability lead from 2006 to 2011 and a member of the UKISAR Team since 1994





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True Innovation in the Firefighting Foam Industry





Dennis Kennedy

hile the foam industry is changing from long to short chain surfactants in an effort to address the Persistence, Bioaccumulation, and Toxicity (PBT) issues associated with this older type of foam chemistry, a change that Solberg completed three years ago, Solberg decided that the best way to address ongoing environmental and PBT issues was to engineer these problems completely out of the product.

So while industry manufacturers attempt to replace their current surfactants, Solberg has continued to introduce new fluorine free foam concentrates, and will continue to do so in the future. The response from some of the manufacturers and material suppliers to the industry has been one to attack the performance of the products.

In May 2012 a study was conducted titled "Fluorine Free Foam (F3) Fire Tests." In this evaluation, fluorine free foams such as those manufactured by Solberg were claimed to have been tested according to ICAO and EN fire test requirements and the test results used as a basis to state that foams supposedly failed the fire tests.

On the surface, these test results sound significant. How can a foam concentrate that carries all current test certificates for EN and ICAO approvals not pass this supposed independent test program? The answers are quite simple. The report describes how the pre-mix foam solutions were prepared. And to quote the report "Foam concentrate was weighed using electronic scales to ensure accurate proportioning – no account of specific gravity was taken." In the case of the Solberg 6% fluorine free concentrate, and adjusting for specific gravity, the test used a foam premix of 5.5%, rather than the normal 6%. The testing was also done with field modified test nozzles that are not recognised by any fire test standard or approval body.

Over the last few, short years, the industry has radically changed and will continue to change, as all fluorinated foams are re-formulated to match the performance of the longer chain surfactants using the new short chain chemistry. I am not aware of any debate on this subject; the foam industry is changing formulations and re-testing and listing these revised formulations based on the

sprinklers, both upright and

pendent, with K-Factors ranging from 5.6 to 8.0 to

11.2. SOLBERG RF is also

listed and approved with

standard foam chambers. foam makers, standard and wide range proportioners, and all sizes of bladder

Other firsts for Solberg include the World's only Foam Environmental Warranty and the World's only Foam System Upgrade Program. It's one thing to tout environmental responsibility by stating that C-6 surfactant compliance will be achieved as a solution to this problem, but it's quite another to offer an uncondi-

SOLBERG FOAM

Automatic Sprinkler Test, Solberg RE-HEALING RF3, 3% Foam, Standard **Upright Sprinklers**



others have either done this as well or are in the process of changing.

At the same time, the fire performance of fluorine free foam concentrates is improving. Solberg RE-HEALING $^{\text{TM}}$ Foam (RF) is approved to the newest version of ICAO Level B. with another product approved to the newest level C. The foam solution application rate for the Level C fire test is in line with the US Military specification.

Both Underwriters Laboratories (UL) and Factory Mutual have similar foam-water sprinkler test protocols, which in both cases is the most stringent foam-water sprinkler test in the World. Unlike other protocols, these two approval agencies apply foam solution from four sprinklers for 5 minutes, and assuming extinguishment, apply water only for an additional 5 minutes. After an additional 10 minute waiting period, torch tests and burn back testing is performed. Any exposed fuel during this process constitutes failure, and only foams that can produce a high quality stable foam blanket will pass this test.

For the UL listings, and the recently completed Factory Mutual approvals, the SOLBERG RF concentrates are listed and approved at exactly the same sprinkler application rates and minimum pressures as AFFF, using standard non-air aspirated



Large Scale Fire Demonstration, BEST Complex, Beaumont, Texas

change to new chemistry. Solberg did this, and the

tional 20 year Environmental Warranty on your products, or system upgrade programs that allow the user to upgrade to fluorine free foam while maintaining listings and approvals. We would encourage the remainder of the foam industry to follow suit and remove the environmental uncertainty currently associated with our industry. Another point of debate from the fluorinated

tanks.

foam industry is that only fluorinated foams can extinguish a large tank fire. Although this has been repeatedly shown to be false by our emergency response partners, we elected to conduct a large tank demonstration at the BEST complex in Beaumont, Texas, using the same tank, fuel, and non-air aspirating nozzles, with foam application rates as used by other foam suppliers for their demonstrations of their fluorinated foams.

As with the other fire tests and demonstrations, no discernable difference in fire performance is seen

In summary, how is SOLBERG RE-HEALING Foam the same as AFFF?

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- Does not require Special Discharge Devices
- High Heat Resistance
- Flows freely over Flammable Liquids And how is it different?
- An unconditional 20-Year Environmental Warranty
- Fully Backward Compatible with existing foamwater sprinkler systems
- A System Upgrade Program to change to Solberg RF Foam without losing UL and FM approvals
- Full biodegradability
- No PBT chemicals

The foam industry is undergoing significant change and the chemistry of all foams, fluorinated or not, is changing to comply with upcoming environmental regulations and ongoing PBT concerns. Equal performance to AFFF has been achieved with Solberg fluorine free foam concentrate.

Dennis Kennedy is the **Executive Vice President of** Amerex Corporation, a division of McWane. Solberg is a division of Amerex Corporation

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Loretta Spridgeon-Connor

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ire fighters, their families and anyone else in the fire community can call the trained advisers on our helpline for support with any issues, from claiming benefits to improving family relationships. Our website and factsheets also give extensive advice on common problems members of the fire community face. Our staff can visit members of the community at home if a more in-depth approach is needed to solve their problem.

are able to do so because we understand the pressures and demands of your profession – physically, emotionally and mentally. So we're here to offer information and support whenever you need us.

Whether your problems stem from physical injury, illness or emotional upset, there are a number of ways in which we can help you. We offer a range of support including advice and signposting or residential rehabilitation, mental

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Over the years, we have helped thousands of people from the fire community by providing world-class treatment and support services. We and emotional wellbeing and recuperation programmes. Our staff can also visit you at home if solving your problem needs a more in depth approach and we may be able to provide specialist equipment or bespoke assistance if needed.

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THE FIRE FIGHTERS CHARITY

including financial hardship, welfare benefits, employment issues, housing, bereavement, disability issues and adaptations, just to name a few. They are also able to refer you on to our regional beneficiary support team or send you out an application pack for rehabilitation or recuperation at one of our three centres in Devon, Cumbria or West Sussex.

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We're very proud of the huge difference we've made to the lives of fire fighters, retired fire fighters, fire service support staff and fire community



Case Study: Dave and Louise's story



"The Charity's rehabilitation programme is just amazing – everything from the facilities to the setting, the staff to the catering, is faultless. I feel so lucky to have been able to go to the centre. Without a doubt, I wouldn't be where I am today without the help I received from The Fire Fighters Charity..."

Dave is a fire fighter with Hereford and Worcester Fire and Rescue Service. He suffered a horrific accident resulting in multiple injuries and yet despite all the odds, he made a miraculous recovery and believes that if it wasn't for The Fire Fighters Charity he wouldn't be where he is today.

As a fire fighter it's important to be fit and healthy so Dave was very active doing numerous sports including skiing. It was when he was away skiing, walking along an icy path that Dave slipped and fell 4m head first onto concrete. He was knocked out instantly and in a very bad way. A quick thinking friend, who had paramedic training, raised the alarm, cleared his airway and put him the recovery position.

Dave was put on oxygen straight away and air lifted to the local Swiss hospital, where the extent of his injuries were realised. Dave had severe head injuries with bleeding on the brain, 12 broken bones with a total of 22 breaks, a fractured jaw and fractured collarbone. He was in a coma, Glasgow scale 3 – the closest type of coma to death – and no one thought he would survive. His wife Louise rushed to be by his side where she witnessed his lung collapsing four times during the first few days and was told that it was probably time to say goodbye on more than one occasion.

Despite the extent of his injuries and seriousness of his condition, after just eight days in intensive care Dave was out of immediate danger. Although he'd pulled through, his wife Louise was told that he was likely to be in a vegetative state for the rest of his life. "It was truly heart-breaking to see Dave like that," she explains. "He'd been so fit and healthy the last time I'd seen him but he couldn't do anything for himself. I was devastated but I also knew what a determined person he was and knew he would do everything he could to improve."

And slowly, he did improve. After two weeks in hospital, with support from the nurses and physiotherapists, Dave was able to take a few steps. Louise found this small progression very emotional

as she knew it meant Dave had the determination to get back to his usual self. And she was proved right when another week on Dave was able to return to the UK, telling the doctors that he would prove them wrong as he would be a fire fighter again.

Dave was lucky to be getting home as there had been problems with allowing him to fly which had been added pressure for Louise. It was during this time that the Charity got in touch with Louise to offer advice and support. "The Fire Fighters Charity rang me every day that Dave was in hospital to see how he was doing and help me make arrangements to get him home. It was fantastic to have someone impartial that I could talk to as I felt so isolated in a strange country and I didn't want to worry our family and friends further with my concerns."

When Dave got home his ordeal was far from over as he still had a long way to go. "I was so frustrated with my body as it wouldn't do what I wanted it to so I was keen to get to the Charity's rehabilitation centre at Harcombe House to see if they could help me. I had to wait for the all clear from the neurologist before I could go on the therapy programme and although I was looking forward to my stay, I was nervous as I kept thinking 'what if they can't do anything for me and I'm stuck like this for ever?'."

Despite his worries during his first week at the centre, just four months after his accident, Dave's condition improved leaps and bounds. He found the whole experience of being at the centre beneficial. "I couldn't believe how I was when I left the centre compared to how I was when I arrived – I was like a different person! The whole programme was beneficial for me. The rehabilitation was fantastic and my specific exercise programme really increased my movement but it was all the other things you wouldn't even consider that helped me the most. Just having a daily structure, having to listen to others and process information, talking and interacting with other people, feeding and caring for myself – all these elements of the programme helped get my brain going again, improving my thought processing and my speech it was fantastic.

Following his stay at Harcombe House, Dave defied all the odds by returning to work on light duties just five months after his accident. He returned to Harcombe House on two other occasions for further rehabilitation and on one occasion Louise joined him for a weeks' recuperation. Dave's accident had been traumatic and stressful for Louise who had to take six months off work to care for Dave, and also had the added trauma of both her Grandmother and, more recently, her mother dying. "I'm so grateful for what the Charity did for both Dave and I. They've bought my husband back, and were there for me when I needed support and someone to listen."

Dave went back to work at the station fully operational just eight months after his accident, and then achieved an incredible accomplishment of completing the Iron Man Challenge (2.4mile swim, 11mile bike ride and 26mile run) for The Fire Fighters Charity as his way of saying thank you.

THE FIRE FIGHTERS CHARITY

families. But we are still ambitious. Our services are even more in demand – and we want to be there for everyone who needs us.

We are therefore seeking to better understand our beneficiary base and the ever-changing environment in which we deliver our services. In this way the Charity will keep its services up to date, be clear about what it does, why we do it, what it costs and what difference we can make to beneficiaries. This will allow us to ensure that our service provision for you is appropriate and responsive to the ever-changing world you are living and working within.

We now offer our flexible rehabilitation programmes over seven days of the week at all of our rehabilitation centres – this is alongside the existing services for recuperation and rental breaks. Delivering rehabilitation over seven days means that we are now able to offer programmes of different lengths – 4, 7, 10 days which means that access to our services is much quicker. For some problems a shorter length is as effective as our established 10-day programme, and can be followed up at a later date with another short 'top up'.

To access our services and speak to one of our confidential and friendly advisors please call our Freephone Helpline on 0800 389 8820

Being healthy is not just about physical fitness and for rehabilitation to be most successful, programmes need to support both physical and mental health recovery. There are always both sides to the journey when recovering from illness and injury and the Charity understands that positive rehabilitation and re-ablement involves focusing on both the body and the mind.

We recognise that physical injury can have a significant impact on an individual's emotional wellbeing and that psychological stress can impact physical health. By taking a holistic approach and working in partnership with the beneficiary it is our aim to enhance their progress, improve performance and help them achieve realistic goals.

We also offer health education sessions within the timetable which currently include:

- Change how changes in our life can affect us
- Coping with stress and anxiety understanding the stress response and how to improve resilience
- Sleep how to improve your sleep
- Expectations how to get the most out of your stav
- Pain what is pain and how to manage it

Beneficiaries may also engage in individual psychological therapy sessions which provide an opportunity to discuss personal issues with a qualified professional.

The health and wellbeing services provided by the Charity are co-ordinated but we are further seeking to ensure that they are truly integrated



and that we provide a seamless service for our beneficiaries from the time they make contact with us

We're also looking at how to make recuperation a more positive experience, drawing on the fact that most of those who attend for recuperation have some wider health issues we are looking for recuperation to be more active and supportive in achieving positive change and healthier lifestyles.

For further information, eligibility criteria and to see how you can support the Charity please visit our website at www.firefighterscharity.org.uk

We offer flexible programmes, easy access, whole person support and follow up. Even if you cannot attend a Centre, we offer practical and emotional support, advice, equipment if appropriate and signposting to other services.

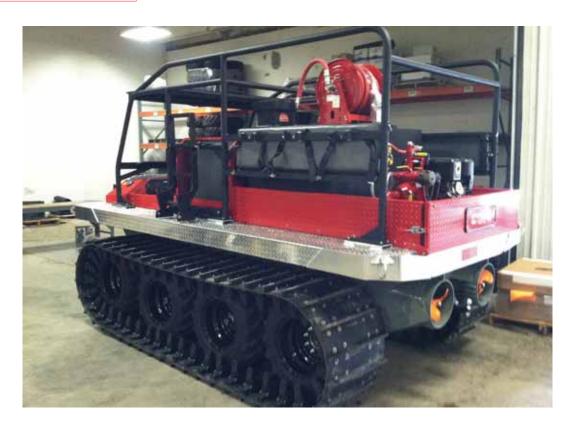
We have a great foundation of excellent services to build on and we will ensure that our services are appropriately responsive to change and that your Charity is positioned to take advantage of opportunities that change may bring to ensure we meet your needs well into the future.

Loretta Spridgeon-Connor is Communications and PR Manager for the Fire Fighters

Charity

For more information, go to www.firefighterscharity.org.uk

43



Multi-Purpose Amphibious Vehicles



Bob Phillips

for SAR and Fire Fighting Operations

In today's reality of limited manpower and reduced assets, every sheriff, fire chief and emergency management agency (EMA) director worldwide is searching for one vehicle that will significantly impact their operational capabilities. Is there such a perfect vehicle? The case can be, and has been made for the addition of a Multi-Purpose Amphibious Vehicle (MPAV) to your department.

PAV are specialised vehicles that should be of robust aluminum construction, small to medium in size and capable of working in various types of climates and conditions: snow, mountains, lakes, rivers and marshes. The vehicle should have the ability to transition from land to water seamlessly. In some countries environmental regulations require the vehicle to produce a light footprint, generating less than 0.91 kilograms psi (2 lbs.) of ground pressure. A payload capacity sufficient to move equipment and/or personnel equal to 907 kg (2,000 lbs.) is also desirable.

Recent natural disasters such as Hurricane Katrina, Super Storm Sandy and Typhoon Haiyan proved the necessity to move both equipment and first responders into a devastated area quickly. Yet, more important is having the ability to conduct triage operations and extract those critically injured in a timely fashion. MPAV should be configured with the ability to transport Stokes baskets or spine boards when the possibility of head and spine injuries occur.

The Philippine Marine Corps realised the need to acquire smaller scale amphibian vehicles during

SPECIALIST VEHICLES



Disaster Relief Operations (DRO). This requirement and capability shortfall was exposed throughout DRO involving Typhoons Ondoy and Pepeng in the past few years, and further highlighted during Typhoon Sendong in Mindanao. In the midst of these particular incidents, access to narrow roads and alleyways limited the capability of larger scale amphibious vehicles.

Flooding causes more damage in the United States (US) than any other weather event, averaging 89 fatalities and \$8.3 billion in damages annually. During May 2010, two separate storms, combined with snowmelt from the North and Upper Midwest regions of the US produced extreme flooding not seen in almost twenty years along the Mississippi River valley. Hundreds of people were killed and approximately 1,300 homes were evacuated in Memphis, Tennessee with another 24,000 affected in Mississippi and Louisiana. Major challenges faced county sheriff and fire departments along with Search and Rescue (SAR) and EMA agencies. Boats, trucks and All-Terrain Vehicles (ATV) had difficulty transitioning from water to land as emergency personnel encountered varying depths and unsure ground. First responders needed a reliable vehicle in which medical aid could be brought into the flooded area and isolated civilians could be guickly and safely evacuated. Because of its amphibious capabilities and versatility an MPAV was brought in to assist law enforcement and rescue personnel. Critical operations performed included: rescue of stranded civilians from their homes, shutting off power and other utilities from abandoned homes, flood stage/land surveys and the towing of boats through areas of shallow water eliminating the need to be towed by hand, increasing the capacity for victims to be rescued.1

"lowa Task Force One generally deploys for incidents such as floods and tornados. The need to keep members safe and out of contaminated flood waters is a major concern. It is often difficult to determine what is beneath the water as well as what chemicals are in the water.

One incident we encountered was when our team was deployed to Cedar Rapids, lowa for a flood event. Our search and rescue members were wading through flood waters in a residential area performing a house to house search. The flood waters were contaminated with oil, fuel, sewage, household waste and even diapers floating in the water. While performing a search, one of our members fell into a basement garage (below grade with a retaining wall) not visible because of the flood water. He stepped off of a retaining wall and was submerged under the flood waters. He was taken to the hospital to be evaluated. He was treated with a series of tetanus shots and subsequently acquired a serious sinus infection, which had to be clinically treated.

In 2011, the big Missouri River flood occurred in Sioux City and surrounding states. The floodwaters began rising in the spring and subsided in the early fall. This put urban flooding and swift water rescue in our own backyard. With the floodwaters present for such a long time, the concern for the dikes and levy system holding back the water was great. The need for a vehicle to traverse the urban flooding and keep our members safe was sought. Our ideas moved to a vehicle that had multi-uses. The Team needed something amphibious. Something to carry personnel, tools and equipment and most important be able to rescue people, keeping everyone safe and as dry as possible. The team researched different amphibious vehicles and came across a MPAV that encompasses our needs. All with minimal water contact.

We needed a vehicle that could traverse many different situations as safely. We added options like emergency lighting, winches, roll bars, and a canopy. The biggest add-on was flood lighting needed to light up the night. Most of our deployments seem to be in the dark of night.

The Team received our MPAV in the summer of 2012. The MPAV is able to traverse all types of land and soil compositions with ease. It's "light on its feet" and does not tear up the soil or disturb the vegetation. It is able to enter the water and manoeuvre through it will not much concern for what is underneath such as submerged vehicles, dumpsters, signs, posts or trees. It just runs right over them with little effort. It quickly exits the water onto non-flooded land with ease, without stopping or interrupting our mission.

SPECIALIST VEHICLES



We have found the MPAV to be useful not only for flooding, but for other deployments like search and rescue after a tornado. The MPAV is able to go off road, travel and traverse areas damaged by tornados; areas that we could not access before. The MPAV can crawl over the debris left by the tornado and make its own path to where ever we might need it. If the roads are damaged we can make our own road and get to where we are needed.

During training in the winter months the MPAV has proven to be an excellent snow and ice machine. It travels very smoothly and efficiently over snow and ice.

In closing, we have found the MPAV to be an extremely valuable tool for search and rescue. The unit is able to access areas that were previously inaccessible, and also keeps our USAR members safe while preforming search and rescue missions." – John Rentschler, Sioux City Fire Rescue ²

With the world's population participating more and more in outdoor activities, hunting, fishing, biking, hiking, camping, including the recent explosion in 'extreme' sports, a tremendous burden is being put on county, state and federal SAR responsibilities. Now that aviation fuel (100LL) is approaching \$6/gallon, SAR agencies will soon be faced with the challenging decision as to how they will effectively cover such vast and difficult terrains.

Unnavigable roads in rural areas and under developed countries produce their own unique challenges for SAR operations. Dave Maynard, Chief of Operations, Logan County, West Virginia (WV) Emergency Ambulance Service Agency (LEASA) relates the following:

"We found our MPAV while looking for alternatives to rescue people in a small Logan County (WV) community that was facing blocked access due to road construction causing major slides along the only roadway into the community. After much discussion, it was decided the Guyandotte River was the only logical way to evacuate patients in need of quick emergency care. The Guyandotte River is prone to swift rises in the narrow mountain

valley making rescue with small boats a dangerous and unwise manoeuvre at best. We decided the MPAV was the logical and safest choice. In order to help us obtain funding for the equipment, we decided we needed to come up with other possible uses instead of just limiting it to the one project that would end when construction was completed. The more we thought about it the more ideas developed including rescuing people stranded in their homes during floods which this area suffers more than its share. Heavy snows frequent the rural hollows providing another use for either evacuating people or getting food and supplies to them. After getting the MPAV, we have another tool in our arsenal that we consider for use when we get a request for help and decide our response."3

In September, 2013, fire destroyed a large portion of the boardwalk in Seaside, New Jersey. Approximately 200 firefighters battled the fire for days, incorporating a Neptune Pumping System capable of 5,000 gpm. It has been suggested by some experts the ability to attack the blaze from the ocean side of the fire could have significantly reduced the amount of loss. Skid mounted pumping systems are available and can be configured for a MPAV with the proper payload capacity. An MPAV with a hydrostatic design could be a valuable asset when using hydraulic tools. These tools can be plugged into the existing flow system negating the need for additional equipment.

The MPAV should also be considered when fighting wilderness fires and mountain rescue. High winds, terrain and aviation fuel costs can be limiting factors when developing an effective strategy for fighting fires in densely wooded areas or rescuing civilians at high elevations. MPAV's give firefighting and SAR agencies the ability to put fire suppressing agents directly at the source of the blaze and extract injured personnel when necessary.

While there will always be a need for boats and ATV's in SAR fleets; each one fills a specific niche, MPAV's when properly designed and configured can positively impact the capabilities of both SAR and firefighting agencies.

¹ '2011 Mississippi River Floods.' *Wikipedia*. Wikimedia Foundation, 4th February 2014. Web. 4th April 2014.

² Rentschler, John. 'MPAV.' Letter to Bob Phillips. 24th February 2014. *Iowas, USAR, Task Forece-1*. N.p.: n.p., n.d. N. pag. Print.

³ Maynard, David. 'MPAV.' Letter to Bob Phillips. 5th February 2014. *LEASA*. N.p.: n.p., n.d. N. pag. Web. ⁴ Haydon, Tom. 'NJ.com.' *NJ.com*. The Star-Ledger, 13th September 2013.

Web. 4th April 2014.

Bob Phillips is a marketing manager for Hydratrek Inc. Manufacturers of MPAV's in Covington, Tennessee. He has over 20 years of experience in sales, project management and industrial quality control

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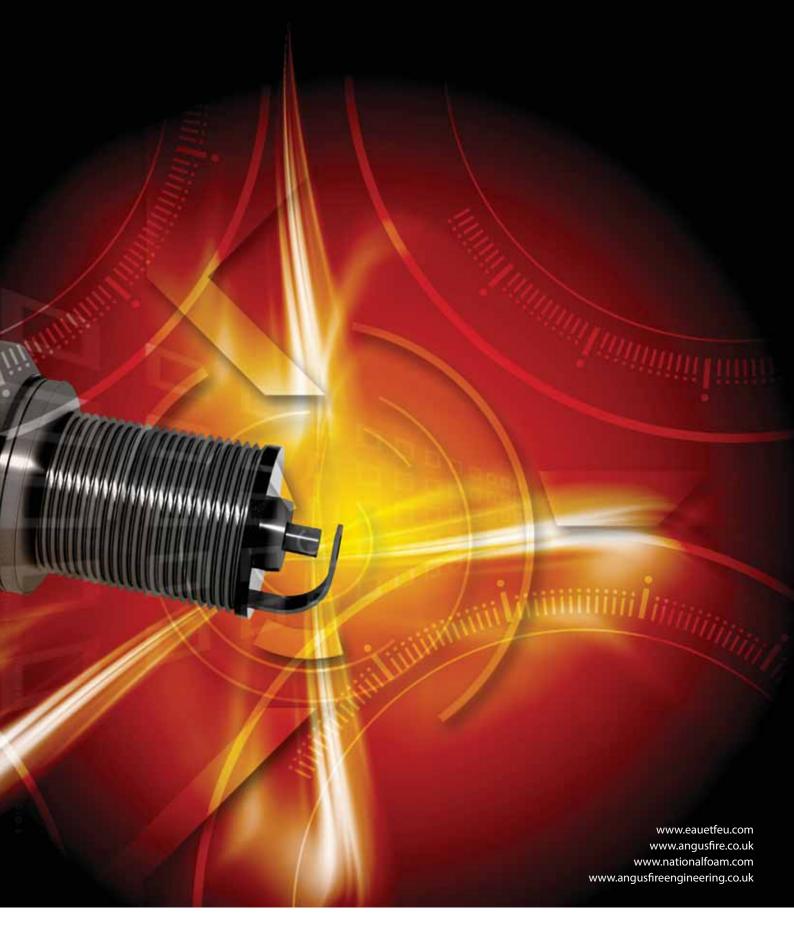
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Extrication from an overturned vehicle



Axel Topp

vehicle overturned on its roof is not an everyday situation in vehicle extrication, forcing rescuers to decide, based on the patient's condition, whether to perform a safe extrication along the patient's long body axis or to conduct an immediate extrication through the opened door.

The decision must be made quickly as the patient has generally been suspended upside down in the seat belt for 10-15 minutes at this point. Time is of the essence not only because of the patient's orientation, so all unnecessary activities should be avoided and the individual rescue modules should be worked through purposefully and in parallel. Righting an overturned vehicle would be inadvisable due to the high risk of further injury to the vehicle's occupants.

Securing the vehicle includes securing the accident site, assessing the situation, fire safety and securing the vehicle with a sturdy support.

Due to the weight of its engine, an overturned vehicle will often come to rest with its rear end pointing slightly upward. A quick initial stabilisation with wedges positioned in the area of the rear corners of the roof allows the 'inside rescuer' to make a rapid assessment of the patient's condition after establishing initial contact. Initial contact can be achieved through a window broken during the accident or through a window, removed at a safe distance from the patient, during glass management. Immediately afterwards, a decision about the rescue method must be made to decide whether to adopt patient-friendly safe extrication or immediate extrication. Regardless of the selected method, during the rescue activities the patient should be supported from the back by an additional rescuer in the vehicle.

Access through the rear end can be expanded for safe extrication by removing the rear door or window and removing the rear seat backrests or the complete back seats. At the same time, open the door next to the patient for emergency access.

If the patient's condition deteriorates, this door can be used to quickly perform an immediate extrication after freeing the patient. However, rescue via a door involves a risk of further injuries.

Particularly while creating the rescue opening (so-called tunnelling), every action needs to be scrutinised and assessed in terms of the time involved – could there be a faster and simpler approach?

Battery management must also be considered carefully for this kind of accident. Even if the battery is accessible it should not necessarily be disconnected – many modern cars have battery-operated seats and without the battery power it may not be possible to adjust their position to facilitate the extrication.



As part of a safe extrication, in addition to partial or complete removal of the back seat bench, the vehicle can be hinged open like a clamshell if needed in order to make more room for the patient. Make cuts on the C (D) and B pillars and the edges of the roof in front of the vehicle's support points. When cutting the B pillars, ensure that the cut is positioned between the roof and the seat belt shoulder bracket. However, before starting work, consider whether the extrication can also be performed without the clamshell approach and expanded tunnelling, or which benefits compensate for the additional time required.

To free the legs, a spreader or rescue ram can be used to enlarge the footwell under the dashboard. Shortening the vehicle's steering wheel spokes at this stage can make the rescue easier at the later stage.

The transfer to the ambulance or the actual extrication from the vehicle calls for good coordination among the rescuers. The patient should be pressed upwards into the seat by two rescuers so that the spinal column is guided by the rearward movement of the seat back. At the same time, insert a spineboard or scoop stretcher into the footwell between the patient's thighs and the dashboard. Match the upward movement of the seat by slowly pushing the stretcher upwards. The movement of the seat back must be slow and smooth so that the patient cannot lose contact with the seat. When the separation between the pelvis and the spineboard or scoop stretcher is small enough, cut the belt and extricate the patient from the vehicle face-down and in the direction of the long axis of the body.

An experienced team can perform the extrication from an overturned vehicle in around 12 minutes if the patient is not trapped. If it is necessary to free a trapped patient, the rescue can last up to 45 minutes.

Axel Topp is a Captain with the Nuernberg Fire Brigade. He is an experienced extrication trainer for both the Fire Brigade and X-TRAP Rescue Training, where he has been specialising with car and lorry extrication for several years.





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Joint working between Aviation and Municipal Fire and Rescue Services



Neil Crosby

During the past decade the advancement towards technical design concepts regarding aircraft construction have been considerable.

he aircraft's role, performance and capability have without question taken transport into a new era for passenger safety. The complexities in construction methods, dimensions and materials bring with it vast challenges towards not only airports and airline operators but emergency services are confronted with dealing with incidents involving aircraft. Historically, there have been a number of incidences in the UK in which aviation and municipal fire and rescue services have conducted operations at the scene of an aviation related incident. Incidents occurring within the operational response area of the aerodrome rescue service will of course be responded to by the operational aerodrome fire and rescue service, however this will impact on the operational fire category of the aerodrome and the airfields ability to remain open for any additional traffic.

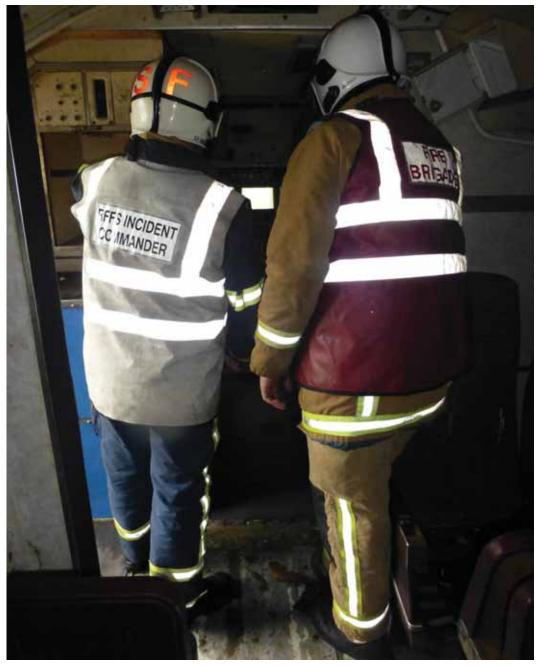
Dependant on the nature and severity of the aircraft accident or incident, aerodrome operational

contingencies will be immediately applied and the correct and appropriate measured approach to the use of rescue facilities be utilised. Airfield operations working closely with the senior fire and rescue incident commander of the aerodrome will identify the requirements and response in order to facilitate the commercial and on-going business needs. Therefore as soon as is practicable, be in a position to maintain the required fire category in order for the airfield may remain operational.

It is within this area of activity that a greater level of understanding and an effective level of response co-ordination can be applied. Not only within the aerodrome boundary, but the specified critical response area of the aerodrome with the combined assets, both the aviation and the municipal fire and rescue services are employed.

Management of vehicles, equipment, facilities and resources from every emergency service must be controlled effectively to concentrate the field of

AVIATION



activity and core initial functions at the scene of operations. A proven approach to incident command will optimise assets, increase availability and provide great resilience throughout the incident. Incident command and the levels of functional control must be established and maintained throughout. The command structure should strive to observe the best practise and the operational abilities of those attending, and ensure these be employed most effectively at the earliest opportunity. Specialist experience and supervision of assets utilised at the early stages will prove most effective and will impact on overall outcome of the event. Considerations must be apportioned to the welfare for all staff engaged for the purpose of rescue and fire fighting.

Municipal and aviation fire and rescue services should have a strategy of interaction, not only when a field of operations occur, but to create a personal bond between services. Liaison should be structured with the intent to improve training, forge relationships, and explore vocational training between services. This practise will also assist in preventing any unnecessary collision between services through embracing what is essentially a best practise approach and enjoying the interaction of transferable skills. This concept is in no way a new strategy but one that when emergency services and their dimensions are evolving, it should be reviewed for the future.

The management and planning of operational training requires the aerodrome fire and rescue service, and the localised emergency services to have a more integrated role map. Current objectives may be met in the form of pre-arranged inter-agency liaison meetings between the local fire stations and the airfield fire service. Far reaching attention to contingency planning and training delivery may form part of developing an adequate provision of logistical technical advisory co-ordinators between emergency training establishments.

A purpose designed aviation liaison training

54





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programme, in which each service provider is able to join together and devise greater control during operational incidents, will improve knowledge, under pinning operational considerations and met both emergency service needs under a local agreement.

The case for improvement suggests that there is currently a short fall identified in this area, due to the fact that a good number of fire and rescue services have no aviation related specialist training facilities. Inter-service consultative meetings may identify the requirement for the need to development in this field of operational understanding.

Further far reaching applications to any reciprocal training course could be to provide an incident scene management programme. The tasks being performed will not be as rigorous and aim to deal with small and less dynamic incidents and the eventual preservation of evidence.

However, it is important to take into account when arranging such activities, the constraints in the form of finance, environmental issues, operational equipment, serviceability, and the general wear and tear of all facilities. All fire services are recognised as going through a dynamic and transitional state and expenditure must be considered against training and the efficient outcome. Aviation training, and the need for which is currently understated and therefore should be taken in to account considering the possibility for external services attending such an incident, in the current and dynamic political climate. The likelihood of municipal fire and emergency services attending an aviation related incident some distance from any aerodrome, and therefore without the attendance of the aviation fire and rescue service, has a high probability, indicating an area which needs development and greater attention. Some services have already approached this matter and a response based forum of resilience maybe most beneficial. It is essential that supporting crews have the knowledge of aircraft and related incidents and casualty rescue. It has been recognised that some fire authorities have highlighted the fact that there is a need for aviation training due to the growing risk area and a joint liaison training format has improved their operational effectiveness at a crew level and a more proficient considered level of incident management.

The way in which any integrated aviation, municipal training course may be formulated must outline the benefits of incident command. Municipal and aviation rescue service have operational rank structures which on arrival at the aerodrome or aviation incident must integrate effectively and will when required to do so take control of an operational event. Falling in line with the Home Office publications, it provides the local authority with overall responsibility at the scene of a major incident. However, this rarely takes place due to the complexities of aircraft and any related hazards that they pose. The two services must understand and appreciate the course and the benefits which it possesses, and allow a smooth passage of information and exchange of empowerment. This if successful, would prove to be most effective.

The idea of being part of a provider rather than a receiver of information has a psychological effect and generates added interest in crew performance. Strong social attitudes form and the collaboration between the two organisations strengthen and create a more effective emergency response.

It may be said that the aerodrome emergency services have in the past been viewed as the lesser of the two. Any inter-agency working commitment should then endeavour to promote the aerodrome fire services ability and the way in which its crews deal with major operational incidents. Due to the construction of aircraft it is essential that all incidents or accidents are dealt with, with the emphasis placed on speed and efficiency.

The demonstration through liaison training can prove this and has the ability to motivate, not only the instructing staff, but all attending crews. It is essential that the motivation of fire fighting crews is maintained to provide an effective emergency service. A sense of purpose, belonging, and the ability to offer a high standard of effective rescue is of great importance to members of any emergency service, regardless of loyalties or employer. This has proven evident when attending the aviation events and the migration of responsibility and proactive approach to a cohesive incident management structure and a practical style of leadership being paramount.

From concept to completion any such programme will involve a host of different requirements and leadership styles. The concept of bringing two emergency fire services closer together, for one outcome will meet with both physical and psychological barriers which will have to be overcome. Local government and service stake holder interaction should aim to mitigate risk and aim to benefit from financial training agreements. Visionary skills will play a strong role, which must lead to the satisfaction of an increased enthusiasm, not only from the officer level, but all those who will potentially benefit from the outcome of any such Aviation and Municipal training interaction.

The future of the fire service and emergency services in general are continuously responding to challenge. Resilience is now playing a greater part in functional leadership, where services are becoming embedded and embracing continued operational capability, sensitive to the needs and budgets of both managements and individual service providers. Continued organisational management is extremely important to design, maintain and implement from its very concept and will without a doubt go a long way to improving operational response and tactical leadership.

The sad truth is that there will, at some time in the future, be a requirement for both services to respond operationally to an aviation accident or incident somewhere in the UK. It is the casualties rescue and not ours and with this in mind we are part of an effective rescue service merge when required to apply our skills in the most applicable method. It should therefore be essential that emergency services keep pace with the technological growth and advance proportionate to the potential hazards posed to the responding agencies. It may well be the case when a municipal fire and rescue service will attend such an event completely independently of partner agencies and will have benefited from the training and understanding gained though an allegiance with the aviation fire and rescue service.

A common bond should be struck not only with these services but with all and learn from past events in order to be ready for the future.

Neil Crosby is an aviation fire service tutor at the International Fire Training Centre in Darlington, UK. After finishing his career at Liverpool Airport in 2010, where he was as Watch Commander, he became an associate tutor for Fire Service College before securing his current position at IFTC. Neil's role involves working with a full range of aviation courses from recruit firefighter to supervisor level. He has been involved in the delivery of both practical and technical training and is currently involved in a lead role to incorporate IFTC's new state of the art Virtual Reality system into current incident command courses.

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REMOTELY PILOTED AIRCRAFT SYSTEMS

Exercise Selfridge, Gloucestershire





Chris Thomas

A Clearer Picture

Despite some initial operational challenges, the introduction of remotely piloted aircraft systems (RPAS) into the fire service is spreading, with technology becoming more accessible and affordable.

ome consider RPAS to be difficult to fly or that the regulations do not allow them to be used easily. This article examines the facts behind these preconceived ideas and discusses current and future practical applications.

Applications within a fire fighting environment

Unmanned aircraft are used to provide situational awareness that can help ensure the safety of fire fighters, minimise risks, identify casualties and establish surrounding hazards. This aerial perspective aids the decision making process and can give incident commanders the confidence to make sound plans based on real-time imagery. Ultimately, and this may seem a bit of a cliché, this could make the difference between life and death. Due to the limited use of RPAS by fire services, hard evidence of this in "real-life" emergencies is difficult to find. However, the experience gained from the use of a small RPAS during a simulated mass casualty event in Gloucestershire in the UK provides some measure of what can be achieved.

Exercise Selfridge

More than 400 emergency responders from across the UK took part in Exercise Selfridge, an annual Local Resilience Forum Exercise held in Gloucestershire. The simulation tested the County's multi-agency response to a "survivable air crash" between a Lynx helicopter and a Hercules aircraft.

The chosen location for the exercise, Cotswold Water Park, provided difficult terrain to organise and direct a coordinated search. Large lakes, surrounded by woodland and grassland, covering an area of 270 hectares (670 acres) meant that the race to hit the "golden hour" for any survivors would be a real challenge.

Resource Group's Unmanned Aviation Services division, in support of Gloucestershire Fire and Rescue Service, deployed a Huginn X1 (a small quad rotor RPAS weighing 1.5Kg) to identify simulated casualties within minutes. The imagery provided was used by the Bronze Commander to immediately direct response teams to the scene, rather than spend time conducting manpower intensive foot searches. In this simulated event these casualties received life-saving treatment within the target time.

As the incident progressed the live video feed was down linked and made available to the Silver Command via a remote link, which was in turn made available to the search and rescue coordination cell and the Gold Command situated several miles away. The system provided a unique view of the crash site and was of great assistance to generating the common operational picture, which enabled a swift coordinated response.

Difficult to Operate?

Technology on these platforms has changed significantly over the years and is constantly being

REMOTELY PILOTED AIRCRAFT SYSTEMS



Exercise Selfridge, Gloucestershire

updated. Improvements in battery life, camera functions, image quality and flying capabilities have allowed operators to gather imagery in a host of conditions including heat and poor visibility.

The most modern RPAS have a high degree of automation and are essentially remote "fly by wire" rather than remote control. The operator simply taps a point on a digital map display and the aircraft moves there, directed by the onboard GPS and sensors. Once in position the camera is manipulated by tapping the video feed to aim it at the desired point. This means that the training burden is low as skills can be learned very quickly and certainly within 2-3 days. As the interfaces are intuitive the skill fade is very low, so this eliminates the need for lengthy retraining if an operator does not fly for a while.

Regulations

The regulations regarding the use of RPAS differ widely around the world; our experience is of the UK regulation. The UK Civil Aviation Authority (CAA) grants a 'permissions to operate' to RPAS operators on a case by case basis. To do so they must satisfy themselves that the organisation applying for permission will operate safely in relation to other air users and also to those on the ground. The standard rules mean that it would not be usual for an RPAS to be operated in an urban area; however Fire Services operate in unusual circumstances. Safety to other air users is covered



Chris Thomas presents Chris Rainford from GMFRS with a Huginn X1

by adhering to the standard below 400ft rule imposed for all RPAS flights and by flying over a cordoned area mitigates the risk to those on the ground. The CAA understands this and has granted 'permissions to operate' to UK fire services in these circumstances.

European trials

The latest UK fire service to start using RPAS is Greater Manchester Fire and Rescue Service (GMFRS), which we have provided with a Huginn X1 to use as part of a wider European trial. The other cities involved are Copenhagen and Geneva which will start the trial over the coming months. The operator from Manchester has qualified to fly the Huginn by completing an approved type course and then passing the Remote Pilot Qualificationsmall (RPO-s) – a total of 7 days training.

The initial response from GMFRS is positive.

Paul Argyle, Director of Emergency Response at Greater Manchester Fire and Rescue Service (GMFRS), said: "GMFRS is carrying out a three-month trial of an air imagery unit, which could help crews tackle fires more effectively.

"The unit can capture and record highdefinition and infra-red images and footage from the air to assist firefighters and officers dealing with a range of incidents where an aerial view would benefit them – such as moorland fires and incidents at large commercial sites.

"A GMFRS officer has been fully trained to work the unit during daylight hours initially, seven days a week from April 14, 2014.

"Not only will the unit provide support during incidents, but it can also be used in training exercises and will help us to build up a library of images and footage that can be used for training purposes, essentially improving firefighter and public safety."

The use of RPAS within the firefighting industry is still in its early stages but with initiatives like the one above, fire services can begin to understand and assess the benefits of such technology to supporting a safer, more coordinated emergency response. We will be reporting in the December issue how these trials have progressed and we hope to deliver some case studies of how the technology has assisted in the day to day firefighting operations.

Chris Thomas is Head of Service Delivery and Platform Sales at the Resource Group's Unmanned Aviation Services division

For more information, go to www.resourcegroup.co.uk/uas





KA-32A11BC

Coaxial scheme of Ka-32A11BC helicopter ensures excellent maneuverability, controllability and precision hovering capability. This helicopter is capable of suppressing severest fires in heavy smoke.

Ka 32A11BC can be fitted with optional specialized firefighting systems.

LIQUEFIED NATURAL GAS





Paul Taylor

Fire Protection of LNG Assets

Whether you own or work at a liquid natural gas (LNG) plant, a fire fighter or just a neighbour of one, it's in everyone's interests to minimise fire risks. This feature looks at how that's being done in increasingly sophisticated ways and issues a warning for what more can be done to save lives in the event of an incident.

Those against liquid natural gas equate the conventional carrier's load of 135,000 cubic meters to having a base energy of 3,280 Tera Joules – the equivalent of 40 nuclear bombs.

It's an irrelevant comparison – nuclear fission is many times more powerful than a hydrocarbon bomb. LNG is not flammable or explosive in its liquid state. Its vapours need to mix with a maximum 5% concentration of air to burn.

Emerging LNG Standards

But the nuclear comparison does illustrate the scale of the fire risk as LNG is transported, stored and processed. That's why we're seeing some of the most stringent, internationally-recognised standards when it comes to passive fire protection technology.

The international standards governing LNG apply to both risks offshore and onshore: International Fire Codes, Standards and Ratings including EC Directives, ISO 9001, ISO 18001 and ISO 14001.

Dash For Gas

Demand for LNG is growing at such a rate it's led to a 'dash for gas' to meet domestic, commercial and industrial consumption. LNG is favoured for all types of heating including combined heat and power plant as well as diesel engines. LNG is now fuelling 'megaships' and there's even talk of locating data centres near LNG facilities because of its powers of refrigeration which are currently lost to the atmosphere during processing.

Natural gas is now a household name and used across almost every industry sector but LNG technology is relatively new. It emerged in the 1960s but took until 2000 to mature as a mainstream transport technology which allows 'stranded gas'

- that which cannot be transported by pipeline - to get to market.

World events impact on LNG prices such as the Fukushima nuclear power plant, shale gas in America and recession in Europe which led to a glut of LNG in 2008. Regional prices waiver from \$2.8 mBtu (thousand British thermal unit) in the US to \$12 in Europe and as much as \$16 in Asia.

Farther, Deeper, Hotter, Riskier

Offshore is an increasingly aggressive environment. Deeper sea drilling means operating at higher pressures which means hotter temperatures are involved which increase the risks.

Onshore, many ports still have no facilities for LNG liquefaction and regasification because, by their nature, they're bespoke and expensive. Such facilities are always long-term projects where contracts are measured in decades rather than years.

The plants require heavyweight capital funding (often fiscal) and regulatory support with a formidable pre-development checklist comprising: economies of scale, committed off-takers and high levels of expertise at every stage. One of those stages is designing fire protection. I've been involved in that design process as well as installing and maintaining passive fire systems for LNG assets for most of my career to save lives – plant operatives, fire-fighters and civilians – as well as the environment.

LNG - How It Works

LNG arrives at the port super-refrigerated at -162°C where regasification plants transform the LNG back into gas as it enters a gas pipeline network which ends at the point of use e.g. when we turn on our gas hob at home.

i AGCS (Allianz Global Corporate & Specialty) estimates ships' capacity will grow by around 30 per cent every four to five years, meaning the arrival of 24,000 teu carriers can be anticipated around 2018. ii 'A liquid market – Thanks to LNG, spare gas can now be sold the world over', The Economist, July 14 2012.

LIQUEFIED NATURAL GAS

LNG tankers deliver their cargoes across the globe.



Liquefaction equipment at Chevron's Wheat-stone LNG facility in Australia will cost circa A\$29 billion (\$29.7 billion) for 8.9m tonnes per annum – the equivalent of 12 billion cubic metres, which is more than 25% of the country's total gas production.

In the 1980s, building a liquefaction plant cost approximately \$350 per tonne of LNG per annum (pa). Progress in technology dropped that cost to \$200 per tonne of LNG pa, in real terms, in 2000. By 2012, that cost had risen to as much as \$1000 per tonne of LNG due to the price of steelii.

Today, only 19 countries currently export LNG although trade has increased one hundred fold – 3bcm in 1970 vs. 331bcm in 2011.

Qatar first exported LNG in 1997 and it became the world's market-leading exporter in 2006 overtaking Malaysia, Indonesia and Algeria and is now responsible for a quarter of the world's LNG exports. All of the LNG coming into South Hook plant at Milford Haven in South Wales is from Qatar. It's then stored in five tanks and supplies up to 20% of the UK's total consumption.

Currently Japan is LNG's biggest importer but China is fast catching up.

Capacity Set To Double By 2020

LNG capacity is set to double by 2020 which is driving investment in new technology which, in turn, will make more LNG commercially available.

As gas supplies increase, markets relentlessly globalise and integrate, prices may well fall which will put protecting assets and finding efficiencies top of the agenda.

LNG - Risky Business

Many industrial materials are capable of reaching 1100°C in a hydrocarbon fire. It's not enough to make safety a priority as priorities change. You have to make safety a value of your culture

90 million cubic feet LNG explosion in Cleveland Ohio in 1944.

because values tend not to change. You engrain that safety culture in everything you say and do and by integrating all the relevant policies: health and safety, environment, quality and training.

Using Passive Systems To Protect An LNG Asset From Fire

Passive fire protection involves treating critical parts of buildings and planet with protective coatings which buy time in the event of a fire. Active systems – eg sprinkler or foam systems – only come into play in the event of a fire.

The main considerations in best practice are:

- Planning
- Design
- Construction
- Maintenance
- Documentation

Passive Fire Protection Ratings

The most commonly adopted standard is two hours. Many remote plants have on-site fire services. If not, they will have a corresponding lift in fire protection from two to four hours rating. That gives fire fighters more time to take control or resolve the situation safely.

It is in the plant owner's interest to achieve the highest standards of fire protection to reduce the risk of loss of production and protect their assets (buildings, structures and equipment) and therefore revenue streams.

National Database

For all this protection, a fire-fighting crew – arriving at an LNG plant on fire today – relies upon the vigilance of the local fire station to identify the plant on its special risk register. Each fire authority deals with these risks in their own way.

What we need is a universally-consistent database, securely hosted in the cloud, detailing all the salient information:

- date of last inspection ie how reliable is the information we're being given
- how many tanks of what capacity
- which materials do they containare they flammable or explosive?
- are they flammable or explosive?
 fire rating eg of structural steels etc how many
- fire rating eg of structural steels etc how many hours the structural steel will bear what weight, how long into what temperature and type of fire (eg jet or pool fire) or blast.

All this quick-to-access information will help the fire fighting team make sound judgements of the situation they're heading into on their way to the fire so they can mitigate the risks or make a decision to let it burn out.

Paul Taylor is fire protection project manager at Deborah Services which specialises in hydrocarbon fire protection

For more information, go to

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FIREFIGHTER/EMT SUICIDE AWARENESS

An Internal Size-Up

Jeff Dill

"911, what's your emergency?"

This simple phrase is heard by thousands of callers, on a daily basis, by people who are asking for an emergency response to some type of crisis going on in their lives. They need assistance, from first responders, because they are unable to handle the physical or emotional issues they are currently experiencing. It is an instinctive and inner drive to reach out and ask for help, from our early childhood days, when we were dependent on our families, friends, and teachers. So why the change when we put on our fire uniforms and head off to the fire station for our shift, or responding from home as a volunteer? Welcome to what I call "cultural brainwash."

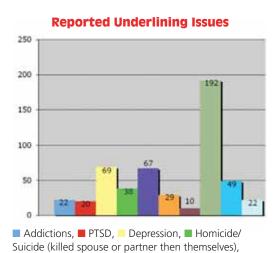
How We Must Act

have been in the fire service for nearly twentyfive years and currently a Captain for a career department in a suburb of Chicago, IL. As founder of Firefighter Behavioral Health Alliance (FBHA) and a licensed counselor I began to notice, even within myself, about the behaviours of the men and women in the fire service. The examples of behaviors such as being caretakers, risk-takers, proud, dedicated, self-sacrificing, and brave are just a few to mention. Notice how behaviours can be positive ones? Sometimes when people hear the word "behaviours" they tend to think negatively at first. Yet, the behaviours can be based on the cultural brainwash. From our first days in our uniform or in the academies, we are trained to act with bravery, honour, self-sacrificing, show no weakness, keep emotions in check and be a firefighter that stands proud. So the question is, are we trained this way or do we succumb to peer pressure and a history of the fire service culture?

I believe every firefighter has had the same experience and that is they can go anywhere and be told by people in the general public just "how brave you are" and that "we admire your courage" or "you are real hero's" and so on. As humans, who are firefighters and EMT's, we have the tendency, to not only believe we must act a certain way around the firehouse, but also in the public's eyes. We then begin to conform to the way we act, which incorporates our personal lives meaning, we need to act this way 24/7. Since we believe we must not show weakness, keeping all the tragic images inside us, or issues we deal with in our personal lives, our communications tend to lack on how we feel, and then we decide to "handle" our problems on our own. With that we might fall prey to addictions, stress, depression, post traumatic stress disorder (PTSD) or even suicide.

What is the FBHA?

The Firefighter Behavioral Health Alliance, a nonfor profit, was founded in 2011. We are the only known organization in the United States and perhaps globally, that collects data on



■ Marital/Relationships, ■ Legal Issues, ■ Financial

Issues, ■ Unknown, ■ Combination of Issues,

Medical Conditions

firefighter/EMT suicides. We do this for numerous reasons but the top two are to never forget our brothers and sisters who suffered so deeply that they felt the only way to escape their darkness, pain, guilt, shame or suffering by taking their lives. The second reason is to learn what are the issues they were facing that caused these tragedies and how can we learn from them? On our FBHA web page (www.ffbha.org) we have a confidential reporting system where firefighters, chiefs, friends or family members can submit a confidential report about the loss of a firefighter or EMT. We do not require names for our data. We do however require the following so we can validate that such event has happened which are year, fire department, state or country, age, rank, method, active or retired, and known reason for suicide. In the chart below you will see the most documented reason was "unknown". The second and third

FBHA takes all of the information and develops our FF/EMT suicide awareness/prevention workshops around the collected data to educate my brothers and sisters. The workshop titled "Saving

causes are depression and relationship issues.

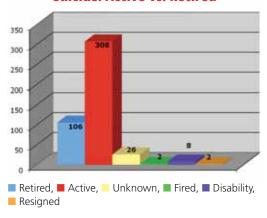
FIREFIGHTER/EMT SUICIDE AWARENESS

Those Who Save Others" has been very successful across America. Yet, the credit for the success is due to fire departments and Emergency Medical Services organizations, which are becoming proactive in wanting to educate their members. This is a switch in our culture, in which there has been a shortage of training on behavioral health.

FBHA Data

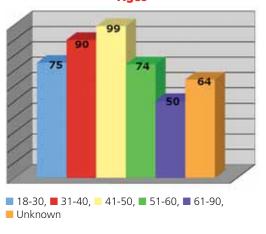
As indicated earlier we keep stats on other information and what we found surprised us especially in two areas - one being retired firefighters who take their lives. Within this subject I could write for pages. We felt it was so important that we now include a section of our workshops to retirement and after interviewing firefighters who retired we found there was a lack of planning on their part. This was not financial, but emotional which included a detachment from a culture and lifestyle. FBHA promotes to fire departments and EMS organizations to begin looking seriously into the issues of extending counseling options to retirees to deal with the detachment issues, emotional loss or perhaps Post-Traumatic Stress that might be occurring. When one retires from years of service the tragedies and horrific images are not left at the door. They are carried for a lifetime!

Suicide: Active vs. Retired

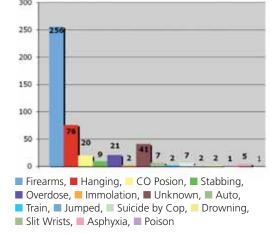


As for our second surprise it concerned the ages of our firefighters/EMT's that have died. In society many studies have shown that it is typically an older male that leads the way in stats for suicides. Within our data, and due to age limits within the fire service, FBHA still found it surprising that the age groups were fairly even across the board.

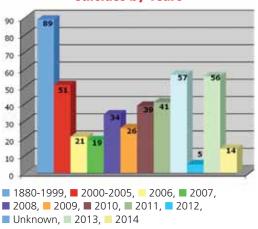
Ages



Suicide Method



Suicides by Years



The FBHA validates all reported suicides to us. The most common validation when the suicides are recent is through conversations with the fire chief or designee from that department or organization. They are difficult calls to make but the issue needs to be addressed. FBHA has found that 99.9% of the fire chiefs have openly discussed the issue since they know we are not requesting names of the deceased. FBHA started tracking global suicides since countries as far away as Australia have contacted FBHA although these documentations are normally made through media stories.

Signs and Symptoms

When we speak to fire departments to validate and discuss their recent loss FBHA began to find a common theme. It was reported numerous times that fire departments did not see the signs or know the symptoms. They also reported to us their lack of knowing resources or how to communicate with each other. FBHA has dedicated their workshops to these important issues. There are numerous signs of emotional stress, which can possibly lead to suicides such as addictions, nightmares, stress, depression, or relationships problems. What FBHA has found through talking to firefighters are the following "Top Five Warning Signs for FF/EMT":

1 <u>Isolation:</u> Watch for those members who seem to disengage from either their fire department friends or their personal family members.

FIREFIGHTER/EMT SUICIDE AWARENESS

Country	Year	Age	Rank	Method
Scotland	2011	24	RAF FF	Hanging
England	2011	54	FF	Hanging
England	2009	Unknown	FF	Unknown
England	2007	46	FF	Immolation
England	2007	43	Senior FF	Unknown
England	2012	43	FF	Hanging
India	2011	Unknown	FF	Firearm
England	2012	35	FF	Poison
India	2012	28	FF	Hanging
England	2007	53	FF	Hanging
England	2010	23	FF	Hanging
India	2013?	Unknown	FF	Hanging
England	2010	47	Senior Officer	Hanging
India	2012	42	FF Driver	Hanging
England	2008	22	FF	Hanging
Scotland	2009	50	Sr Officer	Hanging
Scotland	2002	31	FF	Jumped
England	2009	49	Former FF	Hanging
India	2013	24	FF	Hanging
Thailand	2008	30	FF	Hanging
England	2013	48	FF	Hanging
England	2013	36	FF	Hanging
England	2008	49	FF	Hanging
England	2009	40	FF	Hanging
India	2013	31	FF	Poison
Australia	2011	43	FF	Hanging
England	2010	43	Vol FF	Hanging
Australia	2008	40	Paramedic	Firearm
England	2009	52	FF	Firearm
England	2014	44	FF	Unknown

Record of global suicides tracked by FBHA

- 2 Loss of Confidence in Skills: These were competent FF/EMT who could not remember how to put their pumps in gear, forgot drug administration policies, or Incident Commanders who feared going on calls because they lacked confidence in their abilities.
- **3** <u>Sleep Deprivation:</u> Both at the firehouse and at home.
- 4 Anger: We know there is anger in the firehouse. We typically try to avoid members who display anger but these are signs of other issues.
- 5 <u>Impulsiveness:</u> Watch for members who display a change in actions or words. Example: A member who has been anti-gun yet one day decides to go and buy some handguns and a rifle for some unknown reason.

The themes behind FBHA workshops are: Challenge with Compassion and Be Direct. Fire-fighters and EMT are blessed with what we call "Gut Instinct". It is best to use this when you hear or see one of your own acting differently than previous times. It is then we need to Challenge with Compassion and Be Direct. Find out what is going on. You can do this through a non-evasive form of communications. We are taught that it is always better to be proactive than reactive. This becomes even more important when it involves either one of our own members or us that are struggling emotionally.

Department Resources

There are numerous fire and EMS organisations who utilise Employee Assistance Programs (EAP). As a licensed counselor I have found that most counselors are great people yet do not understand the culture and lifestyle of firefighters and EMT's. This unfortunately translates into many EAP organizations, hired by City Halls or Villages are not prepared to deal with firefighter issues. Most EAP

organisations are selected by the lowest bid. Fire Departments and EMS organisations need to be more involved in the selection process. They need to become involved in the interview phase of selection to ask the bidding EAP organization if they have counselors who are familiar with or have dealt with the fire service culture. Also, find out if there is a Chaplain who wants to be involved within your organisation. Plus do some investigating to see if there are qualified counselors that live in your community who work with firefighters. Create a resource list for your members. Once again, being proactive produces the best results for our members.

Final Word

FBHA has only touched the surface in this article on the issues of behavioral health within our culture. We have seen thousands of firefighters through our workshops and continue to schedule more each week when contacted. It is our goal to visit countries like England, France, Australia and many more with our workshops. Suicide is a global issue within the fire and EMS service. Yet, it ultimately comes down to ourselves who must understand our own actions and what struggles we are currently dealing with. I believe the numbers discussed in this article reflect only approximately 10-12% of the US fire departments who know to submit FF/EMT suicides to FBHA. What would the numbers look like if 100% start reporting? Let me leave you with this scenario:

If, as Incident Command, I ask you to take a fully charged two and a half inch line to the third floor by your self, could you do it? I doubt it! You would need to ask for help. So what makes anyone think they can handle stress, anxiety, depression, PTSD or suicidal thoughts by themselves? You can't. You need to ask for help!

Jeff Dill holds a Masters Degree in Counseling, is a Licensed Professional Counselor, and is currently a Captain at Palatine Rural Fire Protection District in Inverness, Illinois. He founded FBHA in 2011 to educate fire fighters and fire officers on suicide awareness and prevention and travels the country discussing the data collected on the number of firefighters and EMS personnel who tragically have taken their lives.

For more information, go to www.ffbha.org





Responding to wildfire risk in Northumberland (UK):



Robert Stacey

Training and Partnership Working

Although the UK is not commonly recognised around the World for experiencing significant wildfire events, historically the UK is in fact vulnerable to severe wildfire seasons – as was discussed by Paul Hedley in the last issue.

or example, during the Spring of 2011 the UK suffered a particularly serious wildfire season. For the period from 18th April to 6th May 2011, Fire and Rescue Services (FRS) in England attended 7,100 outdoor fires, several hundred of which were classified as major incidents. Similar demands were placed upon the FRS in Northern Ireland, Wales and Scotland.

While awareness of wildfire as an important issue has perhaps only recently been identified at a national level in the UK, there is a longer history of awareness of wildfire issues at the more local level. For example, wildfire has been considered a significant risk in the County of Northumberland in North East England for a number of years. It is for this reason that since 2004 Northumberland Fire and Rescue Service (NFRS) has been working with a range of partners to develop and improve its approach to a whole range of wildfire issues, from prevention to preparedness and response.

The purpose of this article is to summarise some of the key work that is currently being delivered in Northumberland to provide a case study of how wildfire issues are being addressed in one area of the UK.

Wildfire training for Fire and Rescue Services and partner agencies

During 2004, and following the experience of a number of wildfire incidents within Northumberland, NFRS initiated a project to critically appraise its entire approach to wildfires and the training provided to fire fighters and fire officers. The key findings of this initial work were that wildfire incidents presented unique challenges and risks to the safety of NFRS's fire fighters and that the Service could implement a number measures to improve the safety, effectiveness and efficiency of its wildfire preparedness and response work. The Service actively engaged with a number of other

WILDFIRE



partner agencies and began the process of reviewing and revising its policies and procedures. This work was then followed by the development and delivery of wildfire-specific training to fire fighters and fire officers.

For more than 6 years, NFRS has been successfully developing and delivering high quality wildfire training to its fire fighters and fire officers. NFRS has also successfully delivered wildfire training to local land managers and partner agency staff, as well as to fire fighters and fire officers working for 21 other FRS in the UK, a number of FRS in the Republic of Ireland and a FRS in Denmark.

NFRS's wildfire training courses teach a number of important skills and concepts related to wildfire suppression operations and incident management. Some of the key topics covered include:

- Wildfire terminology
- Understanding fire behaviour and fuels
- Understanding the wildfire environment
- Situational awareness
- Identifying and managing risks using wildfirespecific safety protocols
- Wildfire Prediction System
- Wildfire suppression tactics and suppression plans
- Incident Command at wildfire incidents
- Field skills
- Opportunities and risks of suppressing wildfires during the hours of darkness

NFRS also teaches valuable transferable skills that are of vital importance for all personnel required to operate at a wildfire incident, including map reading and navigation.

One of the key reasons for the success of the training is that all of the courses are structured around a tried and tested teaching model which includes a variety of learning techniques. NFRS's training courses combine theoretical classroom sessions with discussions of real life case studies, table top exercises to confirm understanding and practical sessions to practise techniques in the field. During the 5 day advanced level wildfire

courses, NFRS also invites guest speakers who work outside the fire and rescue sector to provide valuable insights from the point of view of other stakeholders.

Local partnership working on wildfire issues

For nearly a decade, NFRS has been actively engaging and collaborating with a range of partner agencies with the aim of improving the County's resilience to wildfire. This partnership working continues to this day. Some of this collaborative work is facilitated by the Northumberland Fire Group, a multiagency stakeholder group which was setup in Northumberland to address wildfire issues to help protect people, the economy and the environment. During recent years, NFRS has been working particularly closely with Northumberland National Park Authority (NNPA) on a number of local wildfire projects and initiatives. Two of these key projects will now be briefly explained, starting with the Northumberland Collaborative Burning Project and then followed by the Wildfire Automatic Detection System Project.



Northumberland Collaborative Burning Project

In September 2013, NFRS began work with NNPA to deliver an ambitious and innovative two year project within the Northumberland National Park. The project, called the Northumberland Collaborative Burning Project, will help to reduce the risk of wildfires in the County and will therefore help protect people, the economy and the environment.

The project is being part-funded by NNPA



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Sustainable Development Fund and is also being supported by the Northumberland Fire Group.

As has been mentioned, dry springs and summers during recent years have led to a number of wildfires across the heather moorland of the Northumberland National Park. Unless properly managed the peat soils, which have taken thousands of years to establish, can catch fire and burn down to the bedrock. They are irreplaceable, along with the heather, game and wildlife that lives on them.

In response to recent wildfire incidents, and in close consultation with NNPA and Natural England, NFRS has designed and developed the collaborative burning project. During the project, NFRS will deliver specialist wildfire training to fire fighters working at rural community fire stations at Bellingham, Rothbury and Wooler, all of which are situated in/adjacent to the Northumberland National Park.

The training is designed in two parts: theory sessions delivered at each fire station; and, hands-on practical training delivered during collaborative burns held at a number of sites throughout the National Park

The highly innovative concept of this project means collaborative burns will bring together a number of stakeholders to work together to share knowledge, expertise and experience which will be to the benefit of all individuals and organizations involved. Each collaborative burn involves individuals from multiple agencies attending previously identified sites in remote rural locations to plan and implement controlled burns. The burns are completed to remove vegetation, in order to

reduce the risk of fire spread, but they are also conducted to simulate wildfires in order to provide the opportunity for training with live fire.

Each collaborative burn is being meticulously planned. The sites of the burns are being specifically identified to ensure that high risk locations are targeted. The high risk areas that have been identified are those that are hard to burn for fuel management or areas that could represent a significant risk to wildfire spread if a wildfire were to occur. All of the collaborative burns are being completed by trained wildfire experts from Northumberland Fire and Rescue Service, retained fire fighters who work from the rural fire stations in/near the National Park, and local landowners and managers. There are significant benefits of involving multiple agencies in the burns. Firstly, firefighters and land managers get to know one another and can develop a good working relationship, which may be of significant importance if they need to work together in the future during a wildfire incident. Secondly, firefighters and land managers have the opportunity to exchange knowledge and good practice on burning and suppression techniques.

The project also aims to provide new skills to the next generation of firefighters and land management employees who will work within the National Park. During the project, wildfire specialists and retained firefighters from NFRS will deliver training to young people aged 13-17 years old who attend branches of the Young Firefighters Association at Rothbury and Wooler Fire Stations. These sessions will provide young people with wildfire training and map reading and navigation skills. The skills to be taught are of vital importance for firefighters attending wildfire incidents, and are also key skills for those employed in land management professions, thus providing young people with important transferable skills to help them in their future careers.

Northumberland pilot of an automatic detection system for wildfire

During 2012, Northumberland Fire and Rescue Service began working with Northumberland National Park Authority and TMS Europe to trial and pilot an automated detection system for providing an early warning for wildfire.

The pilot – the first of its kind in the UK – is currently taking place on the Debdon Hills, near Rothbury. The pilot detection system is currently overlooking the Simonside Special Area of Conservation, which is designated for high level protection due to the presence of important habitats and species.

The innovative system being piloted is a hybrid system presently used in waste bunkers of inflammable materials (mandatory in Germany). The system comprises of two cameras positioned next to one another: an infrared camera to detect variations in heat, and an optical camera to provide camera operators with a method of verifying any alarms that are triggered.

The cameras are mounted on an existing telecommunications mast and are capable of detecting wildfires at a distance of 5 miles (giving a theoretical coverage of over 50,000 acres from one camera). Any variation in heat above a predetermined threshold will trigger an alarm and an operator from a remote site can then train the

72



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•NFPA 1971: 2013

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WILDFIRE

infrared camera and live view camera on the identified area to determine if there is a wildfire before contacting Northumberland Fire and Rescue Service.

The project has been made possible due to a grant from Northumberland Uplands Leader through its independent local panel, the NU Leader Local Action Group. The system was installed in December 2013 and is currently being trialled and tested using small live fires. NNPA and NFRS will work together to conduct further tests of the system throughout 2014.

The results of the pilot will be shared widely with local, national and international stakeholders through a variety of different means and events. If successful, the possibility of expanding the system to cover a larger geographical area of Northumberland National Park will be considered, and it is anticipated that there will be a wide range of applications for the system across the UK and overseas.

International partnership working and the EUFOFINET project

For the last decade, NFRS has been particularly proactive in actively seeking and forming strong international partnerships on wildfire issues. These partnerships have provided opportunities for officers from NFRS to visit and work with leading wildfire agencies around the World, including those in the USA, South Africa, France, Spain, Italy, and Greece. This collaboration with other agencies has enabled NFRS to develop its knowledge, understanding, and expertise to inform the development and adoption of new and improved wildfire policies, procedures and protocols.

One of the recent international collaboration projects that NFRS has been involved in was the EUFOFINET Project. EUFOFINET, which stands for European Forest Fire Networks, was a two year project that was co-financed by the EU through the INTERREG IVC Programme. The aim of the project was to improve and enhance regional and local approaches to wildfire prevention and suppression in Europe.

EUFOFINET involved 13 partners from 9 European countries and was delivered between October 2010 and December 2012. The project activities were structured according to five key themes:

- 1 Wildfire suppression techniques and tactics
- 2 Training using simulation tools
- **3** Territorial surveillance, detection and prevention strategies
- 4 Mapping hazards and fire risks
- 5 Restoring fire-damaged terrain

EUFOFINET was a significant project with ambitious goals and the end results of the project were particularly impressive. One of the most significant positive outcomes of the project was the compilation of the first "European Glossary for Wildfires and Forest Fires", a substantial glossary containing more than 500 terms and definitions which has been translated into English, French, Greek, Italian, Polish, Slovak and Galician. A translation into Croatian is also expected in the near future.

Another key outcome of the EUFOFINET project was that each partner produced an Action Plan outlining how they would attempt to implement some of the examples of good practice that were exchanged during this project within their own



locality/country. These action plans represent a firm commitment from all of the partners to further develop and improve the way they manage wildfire prevention, wildfire detection, wildfire suppression and land restoration. The importance of these action plans cannot be overstated. For example, it was the development of NFRS's action plan which provided a catalyst for the partnership working with NNPA on the automatic detection system and collaborative burning projects. It is through the action plans that the EUFOFINET project continues to have an important legacy within the partner regions.

Conclusions

Wildfire is an important issue in Northumberland and, more broadly, in the UK. NFRS has been working for a number of years to improve how wildfire risk is managed and is now recognised as the UK's leading fire and rescue service for wildfire training and operational policy issues. The Service is currently leading the wildfire agenda at the national level, with Chief Fire Officer Alex Bennett as the lead officer within the Chief Fire Officers Association (CFOA) for Wildfire and the Chair of the England and Wales Wildfire Forum, and Deputy Chief Fire Officer Paul Hedley as the Chair of the CFOA Wildfire Group.

During the last decade, NFRS has made significant progress in improving the wildfire-specific training it provides to fire fighters and the procedures and strategies it employs to prepare for and suppress wildfires. The key underlying factor that has helped NFRS to make these improvements has been a willingness and commitment to work closely in partnership with stakeholders and experts at the local, national and international level. NFRS is continuing to explore, nurture and develop new opportunities for partnership working to enable its personnel to continue to share knowledge, good practice and new ideas which will inform future improvements to wildfire risk reduction and management in Northumberland.

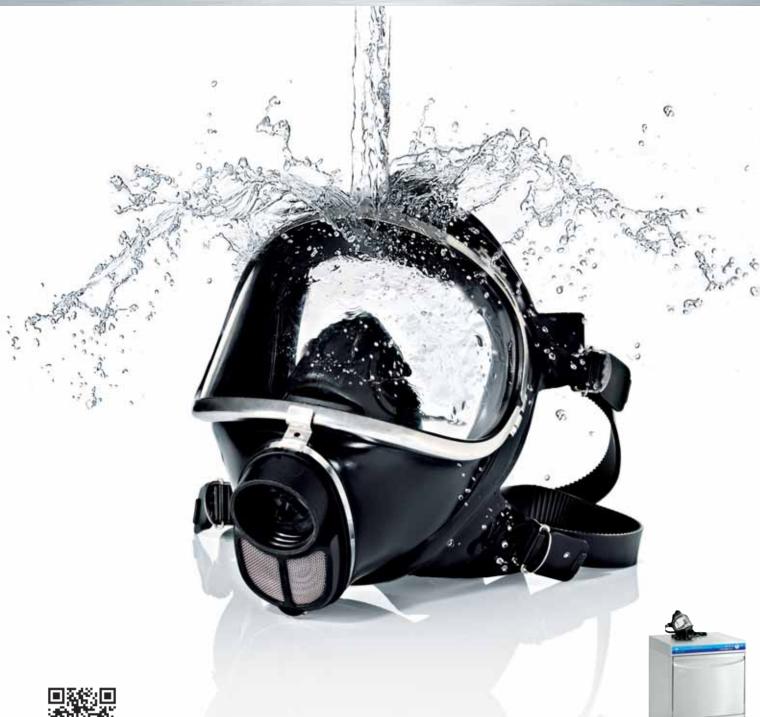
Robert Stacey is Project Officer with Northumberland Fire and Rescue Service

For more information, contact robert.stacey@northumberland.gcsx.gov.uk or go to www.northumberlandnationalpark.org.uk or www.fire.northumberland.gov.uk





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Tony Arkell

Aiding preparedness in the event of a CBRN or major HazMat incident

he Government Decontamination Service (GDS) was set up in 2005 following a review of the UK Government's resilience to deal with the consequences of a range of emergencies. GDS is part of the Food and Environment Research Agency.

The primary functions of GDS are:

- To provide 24/7 advice, guidance and assistance on decontamination related issues to responsible authorities in their contingency planning for, and response to, chemical, biological, radiological and nuclear (CBRN) and HazMat incidents
- To maintain and build on the GDS framework of specialist suppliers and ensure that responsible authorities have access to these services if the need arises
- To advise central Government on the national capability for the decontamination of buildings, infrastructure, transport and the open environment, and be a source of expertise in the event of a CBRN incident or major release of HazMat materials

GDS achieves these functions through its ongoing programme of work, which includes a wide range of projects and work streams designed to bridge gaps in UK recovery capability. GDS manages a framework of specialist private sector suppliers who can be called upon to provide sampling, decontamination and waste management services following an incident. GDS assures supplier capabilities through a number of evaluations and a contract management process.

The work of GDS typically benefits a range of public and private sector stakeholders. For example, during January and February 2012 GDS organised a joint response (acute) and recovery workshop, based around the scenario of a CBRN incident at a major transport node. Delegates representing the FRS, Police, and NHS, private sector businesses, recovery experts, local government and central government departments were invited to the event, both as participants and observers.

The main aim was to take those responsible for response and recovery through the various phases of a CBRN incident from start to finish, i.e. from the bang, right up to the point of release back to the general public or "new normality". Recovering to a new normality is the process of rebuilding, restoring and rehabilitating the community following an emergency, ensuring that the community is progressed to a new normality by identifying any opportunities that go beyond recovery and could achieve longer term regeneration and development.

The workshop aimed to identify the impact decisions made during the response and recovery phases can have on the overall recovery timeline using current state UK structures and guidance such as Strategic National Guidance (SNG)¹ and the UK Recovery Handbooks (chemical and radio-

logical)² produced by Public Health England (PHE). It also allowed stakeholders representing businesses affected to identify critical points of failure.

The workshop was very interactive and resulted in a huge amount of discussion and consideration for the first responders and those concerned with recovery. The response workshop enabled organisations which would be involved in the initial stages of a CBRN incident, such as fire and rescue service and other emergency services, to run through the scenario.

This gave recovery organisations not typically involved in the acute phase of an incident, including GDS and its suppliers, an opportunity to really understand and appreciate the immediate and short term constraints in response. It provided the observers with a real opportunity to see how incidents are approached. This was reversed for the recovery phase of the workshop whereby the response delegates, not involved in the recovery phase, were able to see how their initial decisions and actions impacted on those dealing with the recovery.

By running the workshop through both the response and recovery process all attendees were able to appreciate and understand what was involved. Importantly the workshops highlighted how decisions made, and actions undertaken during the initial response can assist in the timely recovery just by adapting or considering recovery during the response phase e.g. assistance taking runoff water in order to limit discharge to storm drains or the setting up of storage ponds. This also helped to improve understanding of the communications process during an incident and how information can be passed to the recovery organisations to allow decontamination strategies to be initiated at the earliest opportunity. None of these adaptations or considerations compromised the acute response, effort to save life or the criminal investigation.

Out comes from this have included the design and delivery of a series of training courses with the Police National CBRN Centre for Tactical Advisors delivered throughout 2013 and which are now being reviewed for implementation as part of Gold Commander training in 2014. The course aims to make first responders aware of the impact their decisions could have on recovery and how they can assist the recovery process as part of the acute More recently GDS has approached concerning the possibility of using its framework of specialists to remediate following individual chemical exposures, including the handling, transport and final disposal of related waste.

GDS is always interested in engaging with stakeholders who would like to improve their understanding of the link between response and recovery. If you would like any further information please contact us via email gds@gds.gsi.gov.uk or by phone 0300 1000 315.

77

- ¹ https://www.gov.uk/ government/publications/stra tegic-national-guidance-thedecontamination-ofbuildings-infrastructure-andopen-environment-exposedto-chemical-biologicalradiological-or-nuclear-mater ials
- ² https://www.gov.uk/ government/publications/ukrecovery-handbook-forchemical-incidents-and-assoc iated-publications

Tony Arkell is Chemical Hazards Lead at the UK Government Decontamination Service, a role he has undertaken for 5 years. He ensures the UK is resilient to any incident involving toxic industrial chemicals or chemical warfare agents that would otherwise surpass local capability. This includes research and development projects, cross government liaison and developing training including practical exercises

For more information, go to www.fera.defra.gov.uk/gds

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PUMP TECHNOLOGY



Ultra High Pressure



Bill Carroll

- the new (old) tool for fighting fire

High Pressure fire fighting is not a new concept in fire suppression; the use of John Bean pumps, which ran at 800 psi at the pump, 600 psi at the nozzle, pre-dates World War II, when the John Bean Company started making fire apparatus for the US military.

hat has changed to high pressure to make it 'ultra' high pressure? Why is the new (old) tool better than ever?

What is Ultra High Pressure (UHP)?

PSI at the Pump		
0-300	Low pressure	
300-800	Medium pressure	
800-1000	High pressure	
1100 and up	Ultra-high pressure	

National Fire Protection Agency (NFPA) does not define what UHP is at this time. All proposals have suggested that UHP is a minimum of 1,100 PSI. Testing accomplished by the Air Force Research Laboratory at Tyndall Air Force Base indicates that a minimum of 1,100 psi provides the optimal water droplet size and water velocity for maximum throw distance and suppression capability.

UHP's small water droplet allows for more of the water droplet, up to 90% of the droplet, to be utilized. Less water falls to the ground as a result. Only 10-20% of larger, low-pressure droplets are used with the remainder falling to the ground. The smaller droplets create a much larger surface area to remove thermal energy from the fire. Additionally, smaller droplets easily

convert to steam, which has two effects: the steam displaces oxygen from the area and removes more energy from the fire. It takes one calorie of energy to raise the temperature of water from 99°C to 100°C, but it takes 539 calories to turn a 100°C water droplet into steam; when one gallon of water is evaporated, over two million calories of energy are carried away. The smaller water droplets excel at penetrating tiny, more confined spaces (such as vehicle engine compartments) compared to the bulkier low pressure droplets. Think about running through a room carrying a ladder sideways, versus maneuvering by yourself; that is low pressure water vs. ultra high pressure water.

Suppression Capability: Test Results of UHP vs. Low Pressure

Tyndall Air Force Base's Air Force Research Lab, in conjunction with several UHP manufacturers, including HMA Fire, has determined that ultrahigh pressure, defined as nozzle pressure in the range of 1,150 to 1,300 psi, is the most efficient fire extinguishing methodology; efficient equals fastest extinguishment time, lowest use of water, swiftest response time, and least user fatigue. Testing accomplished at pressures below 1,100 psi demonstrated a lack of fire suppression capability when compared to testing at or above 1,100 psi.

PUMP TECHNOLOGY

Flow Rate and Pressure	Extinguishment Time	Percent of Fire Extinguished	Suppressant Consumed
150 gpm @ 125 psi	72.5 seconds	80% 85%	187.50 gallons
100 gpm @ 125 psi 95 gpm @ 125 psi	65.2 seconds 58.8 seconds	90%	152.0 gallons 94.9 gallons
30 gpm @ 1200 psi 20 gpm @ 1200 psi	48.3 seconds 31.5 seconds	100% 100%	24.8 gallons 13.6 gallons
14 gpm @ 1200 psi	68.5 seconds	100%	15.9 gallons
10 gpm @ 1200 psi	105.2 seconds	90%	17.5 gallons

The chart above summarises these results. The low pressure systems used a hand line with 1½" hose and a standard pistol grip nozzle capable of fog and straight stream. The UHP system used a 20 gpm pump with 34" hose and a UHP pistol grip nozzle capable of fog and straight stream. In testing at Tyndall Air Force Base on a JP-8 fire, accomplished in a 3,500 sq ft, 380-gallon test pit, the 20 gpm system extinguished 100% of the fire in 31.5 seconds using 13.6 gallons of water. Low pressure systems (ranging from 95 to 150 gpm, 125 psi) and other ultra-high pressure systems (ranging from 8 to 30 gpm at 1,100 psi) were also tested in the identical conditions. The best low pressure system (95 gpm at 125 using a 134" hose) extinguished 90% of the fire in 59 seconds using 95 gallons of water.

Force Multiplier

In testing accomplished in conjunction with the U.S. Air Force Research Lab at Tyndall Air Force Base in Panama City, FL, a UHP system running at 20 gallons per min, 1,250-1,400 psi at the pump, extinguished fires 50% faster using one-eighth the water as compared to the optimal low pressure system. A UHP 100 gallon skid unit is the equivalent of having at hand over 650 gallons water when compared to a low-pressure system. A 100gallon low-pressure system (at a range of 90 to 125 gpm) will yield approximately 60 seconds (one minute) of water, while a 100-gallon tank with a 20 gpm system will yield 300 seconds (5 minutes) of continuous water on a single tank of water. With automatic throttle and a low water shutdown, a UHP system can be run by a single firefighter, if necessary.

Heat Reduction

In 2009, HMA Fire supplied the Vandenberg Air Force Base Fire Department with its Hydrus™ ultrahigh pressure firefighting system for comparative fire testing against the Air Force's standard structural fire equipment. Thermocouples, sensors, and infrared cameras were installed in each of the five houses burned to capture data during the firefighting.

The results were striking. The UHP system provided by HMA Fire, operating at 20 gpm and 1,400 psi outperformed a standard 95 gpm/125 psi system by:

- Consistently extinguishing fires in 50% less time
- Using 80% less water resulting in significantly less interior damage
- Restoring visibility within seconds for improved safety
- Creating no heat roll-back to reduce heat stress

Positive Pressure Ventilation

When using UHP, the speed of the water and the size of the water droplets create positive pressure ventilation; no fans are required.

Ease of Use/Ease of Training

Firefighters interviewed after testing also reported that the HMA ultra-high pressure systems using a ¾" hand line were easier to handle and resulted in less physical strain than the common 1¾" hand line used on fire apparatus. The ultra high pressure line can be handled by a single person, allowing for other attack personnel to view and direct versus dragging and holding line.

With advancement such a automatic throttle control and automatic low water shutdown, no pump panel operator is needed. In conditions that



PUMP TECHNOLOGY



allow, a single person can quickly and safely attack a fire. With the simplification of controls, operators can be trained on the start-up and use of the system in 5-10 minutes.

Quick Response/Fast Deployment

Because of the efficient use of water a UHP system is well suited to fit on smaller, more agile vehicles such as Ford F-Series vehicles or Polaris UTVs. A smaller crew allows for a quicker departure and response time. Several systems have been tested and shown to be operational within 15 seconds of arriving at the scene.

Low Maintenance

A UHP system units are simple to maintain, designed for Forward Operating Bases in Afghanistan and Iraq. The system uses easy to maintain triplex piston plunger pump, Honda gas engine, Hannay hose reels, and UPF tanks/skid unit. Typical UHP hoses have operational ratings at twice the operating pressures and burst pressures at six times the operating pressures.

UHP VS. CAFS

In testing accomplished by the Canadian DND, the HMA Hydrus water-only system was comparable to CAFS in suppression time while using only 50% of the water used by CAFS. Several UHP systems are foam capable and produce 'CAFS-like' foam. A UHP system is less costly than CAFS and virtually maintenance free, requiring no air compressors or air bottles

Types of Fires to be fought with UHP

Vehicle Fires: Quickness of response, for both the apparatus to the scene and commencement of fire fighting, is critical in combating a vehicle fire. Using a command type vehicle with a UHP system can improve scene arrival and fire fighting activities by 15-20 minutes. Efficient use of water requires no readily available outside water sources (accidents do not always happen near a hydrant). Energetic, small water droplets more effectively penetrate the tight areas of engine compartments (remember the guy with and without the ladder running through a room).

Structure Fires: Studies have demonstrated that fire can double in size every 30-60 seconds. The quicker attacking UHP system can prevent the spread of a fire and keep a single room fire from consuming an entire structure. Because the water is used more efficiently, the residual water left behind is minimal as compared to a low pressure system, causing less water damage and helping the victims of the water to resume occupancy of the structure quicker.

Customer Testimonials

Chief Roy Stock, Cascade Volunteer Fire Department, Dearborn MT

"The inaugural fire for the HMA truck was a vehicle fire. Dearborn was mutual aid to the event and was second engine to arrive on scene. The first engine was a CAF with 700 gallons (of water) and foam and expended its entire water resource on this compact car fire. I was asked to show what we could do with our UHP unit. The car fire was still quite active and coming back to life when I used a fog pattern to kill it. Twenty five gallons of water (no foam) killed the fire and cool the engine enough that the wrecker was comfortable loading on his trailer . . . Impressive!"

Devin Mickiewicz, Captain, Vandenburg Fire Department, Santa Monica County, CA

"What was amazing about [the HMA] UHP was that the hose stream seemed to actually consume the fire. I can't find a better way to put it than that. When you pointed a UHP semi-pattern at the fire it just went away."

"It's lighter (exponentially) and easier to maneuver, sucks the life out of the fire, does amazing hydraulic ventilation and uses about a 10th of the water to the same effect (as compared to a low pressure system)."

"I'm telling you UHP sucked the life out of the fire and did it faster than anything I've ever seen before."

Jeffery Sulalski, former Fire Chief, Ft Leonard Wood, MO

"The [HMA] firefighting unit out-performed our two other ARV units with wild land gas engine driven pumps. The ultra-high pressure pump extinguished tree fires from 30-60 ft in height and ground cover fires very quickly and [with] effective extinguishment. The Polaris ATV climbed 1000 ft hills in some of the roughest terrain with no problem . . . "

"The ultra-high pressure unit uses very little water compared to the other [low pressure] systems we have assigned to our unit."

Wild lands: The ability to use a small vehicle to get to places where large apparatus cannot go and the efficient use of water makes UHP a great option for not just controlling, but fighting fire in the wild lands. And when reach/throw distance of up to 60 feet, flames in tree tops can be extinguished as well.

Aviation: UHP systems have demonstrated excellent results on jet fuel fires in testing at Tyndall AFB with adding foam to the water stream. Initial testing in conjunction with the Air Force Research Lab has also demonstrated that UHP systems have proven to be more effective on an engine nacelle fires when compared to a Halon suppression system.

With systems that range from 10 gpm to 100 gpm at greater than 1,100 psi, driven by an independent engine or by hydraulics, there is UHP system available to meet your budget and your fire suppression requirement.

William (Bill) E. Carroll is

General Manager of HMA
Fire, a role he has undertaken
since 2010. Bill received his
Bachelor of Science in
Mechanical Engineering from
Worcester Polytechnic
Institute (WPI) in Worcester
MA. Bill has also lead teams
at General Electric, Danaher
and E-ONE over the course of
his 25 plus years career

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Andy Caughey

Merino lays down the challenge

We now live in a synthetic dominated world where we have been persuaded into believing that man-made fibres for clothing are superior to natural fibres for work wear. We have forgotten the complexity and versatility of wool as nature's performance fibre in providing the essentials in clothing that we need for survival.

The wool textile industry has changed dramatically over the past thirty years following investment and innovations that have taken place at every stage of the value chain. This quiet transformation of the industry has been most dramatic where wool producers and scientists have used selective breeding of merino sheep (a sheep breed prized for its fine fibre) to grow wool as fine as 11.0 mu, that is even finer than cashmere. These fibres are genetically strong and are the essential building blocks for producing superfine fabrics with softness, strength and easy care properties suitable for functional multipurpose garments.

The other significant area of advancement has been in the development of new manufacturing technologies for the processing of these super-fine fine wool fibres. New equipment at the spinning and knitting stages is converting the super-fine wool fibres into innovative wool fabrics that would not have been possible even ten years ago. Compact yarns converted into technical knit structures have created some of the most advanced multi-attribute fabrics in the world today, far superior to any of their synthetic alternatives, offering the user a broad range of benefits. But now, with an improved user experience, it is no longer itchy, scratchy and hard to care for.

Most importantly this super-fine merino wool, when worn next-to-skin, will enhance the protection, performance and comfort of fire and rescue personnel operating in high risk environments.

Heat & Flames

Have you seen the skin injuries incurred from synthetic garments melting into the skin? The hi-tech wicking t-shirts popularised by sportswear brands are injurious and potentially life threatening for anyone involved in the fire and rescue service. A small flame or a burst of heat is all it takes to turn these garments into molten plastic that burns into the skin. Nylon melts at only 160°C and burns robustly at 485°C. In contrast merino wool does not melt, drip or stick to the skin and has natural fire resistant properties up to 600°C.

By issuing a merino base layer you are providing an extra layer of protection for the firefighter against both heat and flames. By issuing long sleeve merino garments you can reduce the discomfort of sweaty inner elbows because of the way merino handles moisture and reduces the potential for lower arm burns that can come from wearing short sleeves.

Heat & Moisture

At some stage, all fire service personnel experience excessive moisture loss and heat exhaustion.



Wicking fabrics made from synthetics have limitations for firefighters as wicking garments only work if properly layered, allowing for the moisture and heat to escape if it can be released into the environment. Synthetic fibres do not actively manage the moisture from perspiration (absorb and release) but rely on evaporation to move excess moisture away from the skin. When worn as part of a multi-layered system, the evaporation process no longer takes place, leading to moisture and heat build-up within the firefighter's PPE. The build-up of perspiration around the body also increases the propensity for steam burns from your own sweat. This single reason should be a major concern for any fire service issuing synthetic base layers.

Merino wool works quite differently to cotton or synthetics. The outer cuticle of the merino wool fibre is hydrophobic (repels moisture) while the inside is hydrophilic (absorbs moisture). Wool actively manages moisture in both a liquid and vapour state through its natural chemical structure, allowing merino wool to absorb up to 35 percent of its weight as moisture without feeling wet, and then releasing the moisture back into the environment. A layer of merino knit worn next-to-skin will improve the feeling of comfort and helps towards maintaining a more stable core body temperature in high sweat environments because

PPE FABRICS



of its inherent ability to moisture manage and thermo regulate thereby reducing the potential for steam burns.

Cold & Wet

Search and rescue call outs can happen on the coldest, wettest days, and the sweat/chill cycle has to be managed when working for extended hours in a cold or wet environment. The skin is your body's thermometer and greatly influences your operational effectiveness. All firefighters have experienced the discomfort of being unbearably cold, but you do not need to feel that level of discomfort as merino can help expand that buffer zone of comfort.

It is known that cotton can kill in cold wet condition because the moist fabric draws heat away from the body and in time lowers the core body temperature. Synthetic garments may initially increase the skin temperature from reflective heat providing a warming sensation but as the fabrics do not thermoregulate, the body starts to overheat increasing the rate of perspiration. In a fire-fighter's layered ensemble this sweated moisture cannot move away from the body because it needs to evaporate, so it condensates and becomes cold next to skin, which in turn speeds up body chilling, leading to user discomfort.

Merino fibre works differently and more effectively. Merino manages to keep operators warm even when wet by moving moisture away from the skin, working to keep the skin dry and at a more constant temperature. The merino fibre actively manages sweat by absorbing and releasing moisture with the inherent ability to hold up to 35 percent of its weight without feeling wet. This is due to the natural fibre structure of the merino follicle, which acts like a tree with its water repellent cuticle on the outside and its hydrophilic interior transporting the moisture away from the skin to be released into the less humid environment.

Sweat & Ease of Care

Fire and rescue personnel accept that sweat and odour is part of the job. Your expectation will be to use a number of shirts that are changed to overcome odour issues . . . but sweat does not smell. Our bodies smell because micro-bacteria feed off the body salts and the moisture we

perspire. You could wear a merino garment 24/7 and not produce odour. Merino naturally absorbs sweat and through natural processes prevents the build-up of offensive odours.

Anti-static

Merino fibre does not hold a static charge, so it can be safely worn in areas where a static discharge could be dangerous, such as around spilt fuel or where there is a risk of an electrical flash over.

Merino - Nature's Performance Fibre

Merino wool is remarkable for each of these attributes but even more so for the sum of these unique properties, which when knitted into specialist performance garments greatly enhances the protection, performance and comfort of any firefighters operating in high risk environments. But what makes merino wool?

Every year the merino sheep being farmed in New Zealand produce a new fleece weighing approximately four kilograms. The soft merino fibre is harvested annually in the spring months to produce garments that can be worn next-to-skin from head to toe. These merino fabrics and garments are easy-care providing the convenience of machine washability up to 40°C. Merino does not retain odours or dirt, so it can be washed clean in low temperatures and without the need of odour-masking detergents. Line drying is the best way of extending the life of these fast drying, lightweight fabrics.

Garments have a natural wear life, so we have the issue of garment disposal particularly as we deal with growing landfills and the guilt of disposing garments made from non-renewal materials knowing that they will take decades to breakdown. Merino fibres are produced from keratin, the same naturally-produced protein that is the building block for our hair and nails. So when the time has come to discard your merino garment, bury it in the garden. Once the merino comes into contact with soil borne bacteria it breaks down and is absorbed into the soil within nine to 12 months. The cycle is complete.

In summary merino base-layer can enhance the protection, performance and comfort of fire and rescue teams by:

- Having natural flame resistance up to 600°C.
- Not melting, shrinking or sticking to skin when exposed to flames or high temperatures.
- Not producing toxic odours when burning.
- Having the highest natural UVP factor against other fibres for added protection from the sun.
- Having a high resistance to acids.
- Offering greater resistance to chemical residues and aerosols than synthetics.
- Thermoregulation of the skin, reducing overheating or chilling.
- Moisture managing the skin reducing the rate of moisture lost in exercise and incidence of skin infections.
- Being naturally antibacterial will not infect wounds.
- Not generating offensive odour even after prolonged use.
- Being soft yet incredibly strong and durable.
- Being annually renewable and are biodegradable.
- Being easy care being machine washable and quick drying.

Andy Caughey is Managing Director of Armadillo Merino

For more information, go to www.armadillomerino.com







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Anytime, anywhere, anyhow learning



Jon Hall

Like all public sector organisations, emergency services the world over have had to adapt and evolve quickly. Tighter budgets, governance changes, and unprecedented shifts in demand through acts of terrorism, climate change and demographic variations have meant that responders are facing daily challenges requiring new skills and new styles of leadership.

The result of this is a sea-change in training requirements that starts with the needs of the organisation (and subsequently those of the individual responder), through to the design and delivery of behaviour-changing training. Very few organisations can afford to effect change alone which is leading to an increasing number of long-term, sustainable partnerships established with training management providers that are helping to deliver change.

Collaboration is key

It's rare for responders from any agency to work in isolation. Whether it's responding to an emergency such as a structural fire, transport incident, civil unrest, or undertaking the vital work of public engagement in helping to prevent emergencies, they will be working with other services, local and national agencies and, increasingly, voluntary groups. To train without recognition of this multiagency environment is to miss a vital component of what it means to be a modern firefighter. This requirement for collaboration is reflected across the fire and rescue service in the UK through embryonic strategic and operational alliances with bodies such as the Chief Fire Officers Association, the College of Policing, the National Ambulance

Resilience Unit and the Local Government Association. Impetus from ministerial support is also provided through programmes such as the Joint Emergency Services Interoperability Programme.

As financial pressures continue to drive change in the UK, it becomes harder to predict what might happen with our own model and whether, in ten years' time, there will still be more than 40 fire and rescue services. A number of influential reports have recently discussed the possibility of government reform and suggested the possible emergence of a new, centralised multi-agency body. But what is happening in the UK is not necessarily representative of the critical services market internationally, so perhaps looking further afield will give a sense of how the market may evolve.

Many nations already operate combined emergency service models and can provide extensive learning for both the benefits and possible pitfalls of such strategies. However, the one thing you never ever hear is that responders should train and operate in silos. What is vital in a country where organisational links are sometimes difficult is that training providers need to be agile and ready to deliver products that work for any emergency service, as well as being adaptable to suit the needs of tomorrow.



Engagement with the wider response community helps training providers keep ahead of the game allowing individual services to strengthen their own operations' core competencies and capabilities of their staff. Put simply, collaboration is key.

Across the training world, increasing emphasis is being placed upon such partnerships. By working with multi-sector professional/industry associations and experts, training programmes are being created to reflect and support current and emerging operational doctrine and guidance. Recognising that training forms a fundamental part of an individual's personal and professional career development has always been central to the design of training, but the new emphasis on collaboration and interoperability means that providers, such as the Fire Service College, must now take on a partnership role themselves.

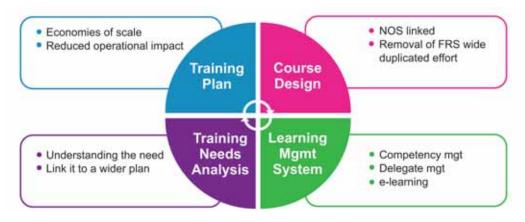
Many organisations still choose to develop, administer and deliver training programmes within the silos of their own geography, knowledge and experience. This can produce excellent training delivery and a sense that local risks are being addressed. Unfortunately, unless exceptionally managed, it also risks missing opportunities to collaborate across agencies and with those further afield who just might have value to offer. It's also true that much of the burden surrounding training can be outsourced to release as much resource for training and service delivery as possible. After all, it

is service delivery that the public truly value and believe that they are paying for.

Back office components such as administration, organisational and individual analysis of training needs, recording of individual competencies all lend themselves to realising an economy of scale not available to many organisations alone. Add this to the time-consuming rigours and costs of accreditation, assessment and assurance and it starts to become apparent just how much some organisations are unwittingly spending on relatively hidden back office services. Working in partnership allows programmes of training that both bridge skills gaps across services, as well as providing clear career paths for individuals. But how can any organisation's training provision break free from the inevitable pressure on quality brought about by restricted budgets?

Flexible and cost effective

It is more important than ever that emergency services are offered flexible and cost effective training. There is always the risk that financial and time pressures start to fragment previously excellent delivery of local training solutions. While there is always going to be the need to tailor learning and development, organisations need the confidence that their staff are working towards nationally and internationally recognised standards. Importantly those standards need to be



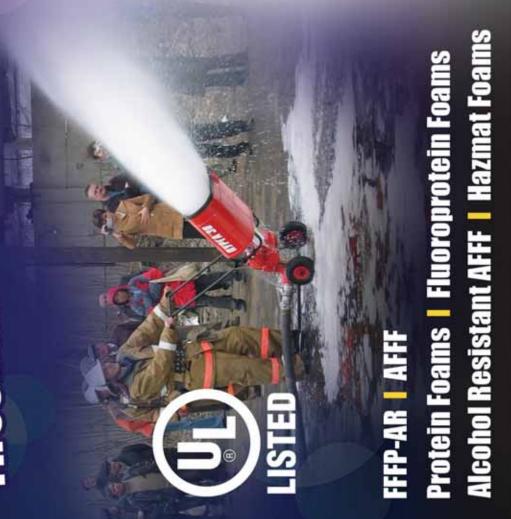


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TRAINING



current and relevant, but will also withstand the scrutiny of hindsight should things go wrong. Accreditation to a standard created by a single organisation, or only recognised by a small number, brings a risk. But exacting standards can be both costly and beyond reach, unless achieved collaboratively or through sector-wide bodies. Delivery of training to such standards in, or near, the place of work and during normal working hours has to be the target.

In many respects it shouldn't matter whether the individual is based 50 miles from a training facility, or 5,000 miles away. These days, staff expect to be able to learn in a way that suits them, at a time and place that is convenient to them. Classrooms, text books and practical exercises may still have their place, but people respond to different styles of delivery when it comes to learning and development.

One of the visions for the Fire Service College is to establish a network of national, regional and sub-regional centres of excellence. This will guarantee a quality of accredited training previously only available centrally, but will effectively place it on the door-step or within services. Underpinning that vision has to be substantial investment in supporting technology.

Engaging with like-minded people via social media, playing games with our friends (and strangers) online, booking appointments via text and logging-on to an account to check our child's attainment at school – it's all part of the norm these days. This has to be reflected in the way we programme, deliver and record training.

Practice makes perfect

The ultimate goal may be to provide a one-stopshop learning approach. Development of what is becoming known as 'The Fire Professional Framework' in the UK seeks to provide a learner journey from recruitment, right up to strategic command of major multi-agency incidents. An individual could enrol in an intensive residential training course mimicking the shifts of a firefighter. This could be followed up with a short course designed and accredited nationally but delivered locally to develop leadership, incident command and decision-making skills which might be supported by an e-learning package for completion at the individual's convenience. Supported by a team of seasoned and experienced professionals, this blended approach provides a secure, discrete, learning environment where individuals have the

ability to practice decision making over, and over again without the risk of spiralling costs.

While practical experience is invaluable to firefighters, it's not possible to prepare for every potential scenario. Rehearsals for major incidents for example, are incredibly complex, time-consuming and expensive. Even repeating controlled live training exercises drains both resource and budgets. Delegates often need an environment where they get a sense of the pressure that comes with their role yet also offers them a realistic and safe environment to make

decisions and take control. Immersive and virtual reality technology provides an affordable, and portable, solution to this problem but will be outside the budget of many organisations. Again, collaborative sourcing and accredited delivery can provide opportunities simply not available to single responder organisations.

Immersive experience

The College recently launched its immersive, 3D training suite to test and exercise incident commanders at all levels across all blue light services. So far, it has developed 16 scenarios for training and accrediting operational commanders and is now being developed further to enhance tactical training packages. The technology provider, G2G3, has provided serious gaming and simulation software for learning and development use. This includes structural fires, transport emergencies, Hazmat and CBRN scenarios - this state-of-the-art technology can be delivered locally via a portable 3D package supported by accredited assessors. This methodology places delegates at the heart of an incident in a realistic environment, often provoking emotions and reactions seen during physical training exercises. Importantly however, it overcomes the cost and logistical barriers normally associated with staging physical training exercises involving all emergency services. Most importantly, there is no cost of failure. It's OK to get it wrong on the journey. What's important however is that delegates don't get that 'ticket to command' until they are demonstrating consistent and reliable decision making.

No silver bullet

The challenge we have, then, is that emergency services aren't operating in a stable environment. The pace of global change means that there isn't a 'silver bullet' when it comes to training. This change relates to the new experiences responders are facing on a daily basis; new regulations and best practice, equipment and – of course – rapid developments in technology. There can't be a one size fits approach to training because every service will – in effect – be operating in a unique environment. What can be provided and must be insisted upon as standard however is quality, assessed, accredited and assured ongoing training delivered wherever it suits you by a trusted partner.

Jon Hall is director of training and organisational development at the Fire Service College, UK. He has over 30 years' experience in the fire and rescue service, most recently as Chief Fire Officer for a county fire and rescue Service, as Chair of a multi-agency resilience forum and leading the Fire Service National Resilience function for England & Wales

For more information, go to www.fireservicecollege.ac.uk



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CONFERENCE REPORT



Matt Bright

4th Annual Fire Safety Technology Forum, Abu Dhabi, UAE

World Civil Defence Day 2014 was marked in Abu Dhabi with the 4th Annual Fire Safety Technology Forum under the patronage of His Royal Highness Lieutenant General Sheikh Saif Bin Zayed Al Nahyan, United Arab Emirates Minister of Interior and Deputy Prime Minister.

he event was held at the stunning Yas Vicerory hotel overlooking the Abu Dhabi F1 circuit and was opened by Major General Rashid Thani Al Matroushi FlFireE, Acting Director General of UAE Civil Defence. He welcomed Lt. General Saif Abdullah Al Sha'far, Undersecretary at the Ministry of Interior along with 158 Delegates from Civil Defence, Ministry of Interior, Police, other Government agencies and representatives from the fire and rescue industry.

In his opening address he said "It gives me great pleasure to open the 4th Annual Fire Safety Technology Forum UAE. In commemoration of the World Civil Defence Day 2014 and already in its fourth year, we are proud to see the growing legacy and impact of the Forum which highlights the Ministry of Interior's and Civil Defence's continuous efforts for highest safety standards and a culture of prevention in the UAE.

In partnership with our colleagues from the private industry this year's forum is again introducing strategies and technologies for the protection of lives, properties and the environment of our nation. We are dedicating this year's forum to Emergency Planning and Resilience and are pleased to welcome expert contributions who will share reports about incidents, combating strategies and best practices from around the world

On the occasion of World Civil Defence Day, the FST Forum will contribute to further build our friendship and knowledge exchange with our international colleagues around the globe.

I am proud to witness the many campaigns initiated by our UAE Civil Defense which continue to result in significant reduction in loss of life and assets. Our 24x7 state of the art operations centre monitoring commercial premises, our e-services through the Dubai Civil Defence website, the design and implementation of the new UAE Fire & Life Safety Code of practice are just some of the achievements we are recognized for and which helped to become a first class leading agency for emergency response in the Middle East.

I would like to thank our main forum sponsors Emirates Response Services, Falck Safety Services and NAFFCO for their support, and I would like to invite all of our colleagues in the fire protection industry, locally and internationally to continue joining hands with us in our daily duty to protect our nation."

The forum started with videos messages sent from senior fire officers from other countries congratulating the UAE Civil Defence on their endeavours to provide safer communities in the Emirates whilst recognising and celebrating World Civil Defence Day. Messages were received from the Chief Fire and Rescue Adviser to the UK Government Peter Holland, CFO David Etheridge from Oxfordshire FRS, General Gaëtan Poncelin de Raucourt from Paris Fire Brigade and CFO Grant Lupton from South Australia FRS (the current International President of the IFE) which added to the international atmosphere of the day. The video messages shared a common theme of fire safety, protection, and service and sacrifice by members of the



emergency services around the world.

The conference was moderated by Lt Colonel Ali Hassan Al Mutawa, Director of Operations, Dubai Civil Defence assisted by Andy Dean, Head of Facades, WSP Middle East. The guest speakers provided interesting and insightful presentations which were well received by the audience and were followed up by a panel discussion at the end of the forum led by Major General Al Matroushi.

The speakers and their presentation topics were:

- Chief Klaus Maurer Fire Brigades Hamburg, Germany: Maritime fire response
- Tony Cash Lead Fire Engineer at Transport for London and Chair at Rail Industry Fire Association: Mass transportation incidents
- Ioannis Galatas Brig. General (ret.),MD, MA(Terr), MC(Army): Chemical, Biological, Radiological, Nuclear and Explosives (CBRNE) Resilience Strategies
- Dr. lan Borthwick Advisor, Borthwick & Associates: Controlling Major Accident Hazards and Incident Preparedness. Best Practice in the Oil and Gas Industry
- Aaron F. Vanney Rolf Jensen & Associates, Inc. Associate Manager: The Role of Smoke Control Systems in NFPA Codes
- Dr. Peter Mansi Managing Partner, Fire Investigations UK & Global and Forensic Fire Investigator:
 Fire Investigation Completing the Circle of Fire Safety

The full presentations of the guest speakers can be viewed at www.youtube.com/channel/UCoQS 8YsQKm-0goXlzzKMEZw

In line with previous years, Major General Al Matroushi led a tour of senior commanders of all UAE Civil Defence forces around the small number of exhibitors and sponsors stopping to talk with each and learn more about their products. This personal, hands-on approach by UAE senior officers ensured that exhibitors got close and personnel contact with the decision makers of the region.

The small, informal nature of the FST forum created the perfect environment for networking opportunities between government, industry and other professionals and is one to be marked in your calendar for the 5th annual forum and the years beyond.

Matt Bright works for the Operations Department of Dubai Civil Defence, a role he has undertaken since July 2012. Prior to that he was seconded from Oxfordshire Fire and Rescue Service to the Fire Service College, Moretonin-Marsh as a specialist tutor in tactical ventilation and fire behaviour later becoming the Development Programme Manager for UK and International foundation training

For more information, go to www.fst-uae.com

CFOA NATIONAL RESILIENCE PARTNERSHIP

A working partnership

As the New Dimension contract approaches its sixth year, it's clear to see the ways in which the partnership between Babcock, the Department of Communities and Local Government (DCLG) and the Chief Fire Officers Association National Resilience (CNR) Ltd has evolved, delivering innovation, resilience and cost savings in the way the equipment and vehicles are managed. More recently, Babcock has supported CNR, as it worked 24/7 to help the flooded communities across the country including Somerset, Berkshire and Surrey.



Mark Burgess

Managing the New Dimension equipment

The 16-year fleet management contract supports the New Dimension Programme which was set up by the Government after the September 11th 2001 attacks. The Programme, managed by DCLG and assured by CNR, ensures that England and Wales' Fire and Rescue services are able to cope with major emergencies on a national scale, such as chemical, biological, radiological, nuclear and conventional terrorist incidents, as well as dealing with large scale incident support.

The 400 vehicles and 175,000 stock items of equipment are stored at locations across the country and operated by the 46 Fire and Rescue Services. Babcock's support helps ensure the number of available assets never drops below an essential level and that the National Resilience capability is prepared in the event of major incident. It is a partnering approach which has yielded real benefits.

In delivering the service, Babcock remains fully accountable to DCLG throughout the 16 year contract, for which DCLG has engaged Crown Commercial Service (CCS) to manage on its behalf. CCS contract managers review and monitor performance against key performance indicators and work closely with Babcock and CNR to identify opportunities to improve the service and value for money.

Supporting through national emergencies

The floods in early 2014 have been documented as the worst for some 250

years – impacting thousands of people and changing some of the country's landscape for ever. Day after day the headlines of the national media were dominated by the extreme weather. Key to recovery at this time was FRS expertise and capability – utilising more than fifty high volume pumping units (HVP) that Babcock maintains.

In supporting its stakeholders over this period, Babcock put in place a dedicated team to support HVP equipment within the Somerset Strategic Holding Area to manage flood reduction activities. The National Resilience equipment came from Fire and Rescue Services across the country including West Midlands, Derbyshire, Berkshire, Merseyside, Nottinghamshire and West Yorkshire.Babcock's Networks business also provided a unimog vehicle to help enable its engineers to reach equipment in the more inaccessible areas.

As the weather worsened in areas, so did the challenges of dealing with the impact on the environment. In West Cornwall, for example, the flooding of the disused Wheal Jane mine threatened the local water supply. To assist in preventing contamination Babcock assisted CNR by arranging for a specially built cradle to be placed down one of the shafts to support the submersible pumps. This provision was supported 24/7 throughout the incident by a mobile maintenance unit.

Delivering real benefits

Working together in the project teams has delivered some real benefits including developing additional HVP capability for dealing with 'deep seam' flooding.

Savings on tyres

Whilst maintenance of the New Dimension

equipment is critical to securing resilience, Babcock, CCS and CNR work together to look for ways to deliver the same service for less. One of the most costly items on the equipment maintenance bill for the New Dimension contract is tyres and a joint team was set up to look at how to reduce costs when the current tyre became obsolete, working in consultation with the FRS Transport Officers' Group.

National exercises & events

Babcock and CNR work closely together in looking at vehicle and equipment requirements for national exercises and events. Not only do these help to test people, logistics and processes, but they provide an excellent opportunity to check on equipment performance under pressure – something that normal maintenance checks can't always test.

Core to the success of these exercises is not just the support leading up to and during the exercises, but in ensuring that all equipment is recovered, fully operational and secured within the right location for its next critical use

Brian Ward, National Resilience Officer for the National Resilience Assurance Team (NRAT) said, "The support that Babcock provides is critical to our operation, enabling us to focus our resources where it's needed such as dealing with the widespread floods earlier in the year. It also provides a full view, at any point in time, of our equipment and the cost across the whole organisation."

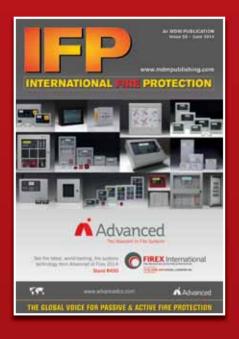
Mark Burgess is Business Development Director for Babcock's Critical Resilience & Emergency Services

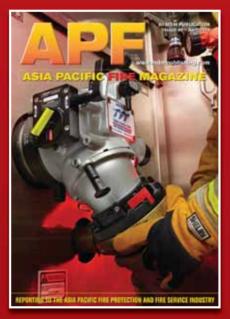
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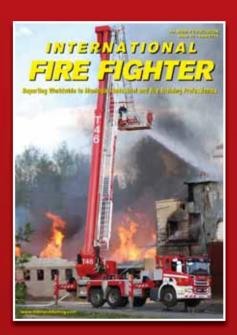


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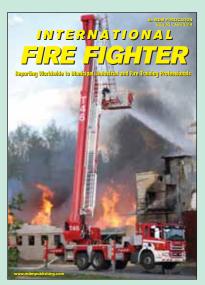


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B.S. Beluftungs-Gmbh	29
Babcock International	55
Bristol Uniforms	75
Cutters Edge	92
Dafo Fomtec	IBC
Dr Sthamer Hamburg	21
Dynax Corporation	78
Emergency Services Training Institute (Texas A&M)	71
Euramco Safety/Ramfan	28
Ferrara Fire Apparatus Inc	63
Fire Safety Devices Pvt Ltd	89
Fol-Da-Tank	86
Gielle	64
Groupe Leader	27
Haagen Fire Training Products	26 & 71
Holmatro	57
ISG Infrasys	24
Kussmaul Electronics	15
Lift Fire	34
Magirus	47
Meiko Maschinebau Gmbh	76
MSA	82
Noha Norway AS	85
One Seven of Germany Gmbh	18
PAB Akrapovic	36
Pacific Helmets (NZ) Ltd	73
Packexe Smash	50
Paratech Inc	74
Pyrolance LLC	68
Quick Lay Fire Attack	10
RHYNO Windshield Cutter	52
Rosenbauer International	OBC
Russian Helicopters	60
Russwurm Ventilatoren Gmbh	32
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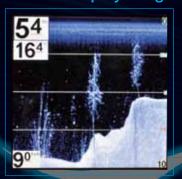
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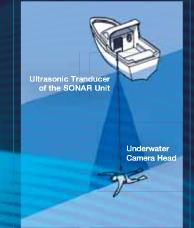
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Sales Manager Mark Bathard

Contributing Editors

Alasdair Hay, Tom Guldner, Ron Jay, Elizabeth Gleason, Craig Shelley, Sue Tarantino, Richard Hosier, Paul Maynard, Dave Pelton, A.K. Rosenhan, Steven Young, Chris Case, Bill Webb, Dr. Richard B. Gasaway, Rick Binder, Mark McGeever, Jean-Francois Bolduc, Duncan J. White

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MDM Publishing Ltd The Abbey Manor Business Centre, The Abbey, Preston Road, Yeovil, Somerset BA20 2EN Tel: +44 (0) 1935 426 428 Fax: +44 (0) 1935 426 926 Email:

mark.bathard@mdmpublishing.com Website: www.mdmpublishing.com

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Contents



19-20

6-12 News, Company and Product Profiles

15-16 vessel Fire

19-20 Stacker Trailer Improves Water **Rescue Response Time**

23-26 Petroleum Storage Tank Facilities -Part 1

28-32 Fire performance of Electric Cables

35-38 The Team **Approach to Road Traffic Collisions**

41-48 What's new with Thermal Imagina Cameras?

51-55 Firefighting Foam Advancements . . Then & Now

 ${f 58\text{-}59}$ whether thev be called volunteers

61-63 тне application of fireground intelligence

65 - 68 The fine line of amateur pyrotechnics

1-72 Building Consensus on Capitol

75-77 The Stealth Killer of First **Responders Part 1**

79-80 if only humans came with handles - the undiscussed cause of back injuries

82-84 Guardians of the Mackintosh: Firefighters save worldrenowned building in Glasgow from a devastating blaze

86-87 Being in the right place at the right time

88 Advertisers' Index









41-48



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The New Global Standard

in high-performance firefighting foam technology

StormALERT™ high performance foam concentrates for successful extinguishment of Class B flammable liquid fires. An innovation in firefighting foam, StormALERT™ high performance foam concentrates are environmentally sustainable fluorosurfactant and fluoropolymer free products. Formulated using new synthetic foam concentrate technology, StormALERT™ high performance foam concentrates offer rapid knockdown and extinguishment, exceptional burn-back resistance, remarkable flow and rapid resealing characteristics and are designed to replace AFFF and FFFP foam concentrates and older fluoroprotein foams.

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Chief Officer Alasdair Hay, QFSM MBA MCIPD MIFireE

Alasdair Hay was born and grew up in Edinburgh before moving to Essex in 1983 to join the fire brigade. He transferred to Tayside Fire and Rescue Service in 1994 and, following further progression, was promoted to Chief Fire Officer in April 2012.

On 16th August 2012, Alasdair was announced as the first Chief Fire Officer of the new single Scottish Fire and Rescue Service, which was launched on April 1st 2013.



Scotland's seamless transition to a national fire and rescue service

t's been an exceptional period of change for those of us working in the emergency services in Scotland. We have marked the inaugural year of the newly formed Scottish Fire and Rescue Service (SFRS), established on 1 April 2013.

The Police and Fire Reform (Scotland) Act paved the way for the most significant reform of fire and rescue services in Scotland since wartime. Eight regional services merged to create a new national organisation. The focus of fire reform was to protect frontline services, reduce duplication where we found it and drive out costs to operate within a much smaller budget. To deliver a more equitable spread of specialist resources across the country and to strengthen our relationships at a local level with councils, partners and the individuals who rely on our services in communities across Scotland.

There was no shadow year to allow us to create detailed plans of how we might develop working structures and take the organisation forward from its inception. What we did have was an absolute commitment from staff to engage with colleagues across the country to ensure that our transition to a single service was seamless and saw no interruption to the critical public services we deliver.

To the credit of our dedicated personnel, that aim was achieved and observers have been impressed at the progress made as an organisation in its infancy contending with change on a massive scale whilst at the same time responding to the continual challenges faced by an emergency response service.

We have responded to incidents that have often hit the headlines not just in our own country but also across the world. From last year's extensive wildfires in the north of Scotland, which resulted in international media coverage of our beautiful highland landscapes, lit up by wide scale blazes, to tragedy later in the year when a police helicopter crashed in the city centre of Glasgow killing ten people.

Then a spectacular but devastating fire at the world-renowned Glasgow School of Art, which saw hundreds of firefighters, battling to save the building's iconic contents. Although the priceless Macintosh library was lost in the ferocity of the blaze, fire crews were praised for managing to save 90% of the structural integrity of the building and 70% of the internal contents.

We have been tested a number of times in our first year as a national service and been under intense public scrutiny but I am deeply gratified that we have withstood that examination and indeed been highly praised on a number of occasions for our professionalism across a range of significant and diverse incidents.

Our staff have most recently been engaged in supporting the delivery of a safe, secure and

successful Commonwealth Games and so once again, it has been imperative that our SFRS plans and preparations have been robust when the eyes of the world are upon us as a nation delivering a sporting event on a scale not seen before in Scotland.

The reform process will take a number of years and is part of a wider public sector reform in Scotland following on from the Christie Commission. It examined how to improve the delivery of public services in Scotland against a backdrop of diminishing budgets.

The financial challenges we face would have existed, irrespective of reform. As a single Scottish Fire and Rescue Service, we're better placed to address them. We have to reduce the cost base of the organisation by around £44 million in the first three years whilst at the same time protecting and improving frontline outcomes.

We must ensure a better, more equitable spread of specialist resources throughout the country, reducing primary fires and critically fire casualties and fatalities. We must continue to respond to emergencies, locally and nationally, working, as we do best, with other emergency services and partners. We must ensure prevention and protection services are at the heart of everything we do, working across the public, private and voluntary sectors to reduce the risk of emergencies occurring in the first place.

The statutory appointment of dedicated Local Senior Officers provides a point of contact for each of our 32 local authorities to ensure we have the mechanisms and relationships in place to work in partnership to reduce risk. Whilst we are a national organisation, the majority of our services are delivered at a local level and we recognise that different parts of the country will have different needs. Only by understanding those local needs can we deliver the type of services the public expect.

One of the key ways SFRS can improve the outcomes for the people of Scotland, is through enhanced relationships with other organisations and individuals to identify better ways of working together to support shared agendas.

Employing innovative approaches in joint venture with our partner agencies will ensure we continue to deliver our vital services and at the same time demonstrate the value we bring to the public. We continue to look for examples of best practice, not just to those working across the UK but also overseas.

As we move into our second year, it is an exciting time for the organisation. A time to consolidate some of the work we have done in year one, maintaining business continuity and developing the way we operate as a single service to ensure we remain in the headlines for all the right reasons and to create a safer Scotland.

Bristol launch range of new gloves

In a further extension of its ownmanufacture product strategy, Bristol has designed a range of three structural firefighting gloves to meet EN659:2008 and which have focused on providing class leading protection and manual dexterity.

The new gloves, which have been designed by Bristol's in-house design team as part of Bristol's New Product Development Programme (BNPDP), have been fully tested by UK firefighters before going into production and will be available in three different fabric combinations. A robust development programme included extensive trials on alternative material combinations as well as the cut, finger shaping and overall dexterity of the fire gloves.

The first product will be available from the autumn of 2014, which is an all-black, soft, flexible leather design incorporating a Gore CROSSTECH® membrane with a Kevlar lining. Special features include silicone finger and palm grips and a knitted Nomex® cuff.



Independent testing has shown the glove to score exceptionally well in cut and tear resistance:

Test type	EN standard	Score
Cut resistance	EN388	5
Abrasion resistance	EN388	3
Puncture resistance	EN388	3
Tear resistance	EN388	4
Dexterity	EN420	4

Two other gloves in the range, which will be available in 2015, will incorporate Hainsworth TITAN® fabrics – the former using TITAN® PBI 1260 and the latter a TITAN® 1220 in red. In common with the leather glove, these both include a Gore CROSSTECH® membrane with a Kevlar lining. Identifying features include silicone palms, reflective piping, knuckle protectors and knitted NOMEX® cuffs. With similar overall rating scores, the individual standard test scores are:



Test type Cut resistance Abrasion resistance Puncture resistance Tear resistance		Score 4 4 3 4
Tear resistance	EN388	4
Dexterity	EN420	4

All three gloves in the range will be available in a wide range of sizes from 6-12 and XXS-XXL.

Commenting on the planned autumn launch, Roger Startin, Bristol's joint managing director said, "This new fire glove range is further evidence of our long

term plan to use our in-house design experience and capability to bring more own-manufactured firefighter PPE products to market beyond our traditional ranges of specialist coats and trousers. Previously the BNPDP has seen the introduction of fire hoods and a firefighter motorcycle suit in 2012 followed by our new EN469:2005 Level 1 firefighter motorcycle suit earlier this year. We're looking forward to showing our new gloves at the Emergency Services Show in September".

For more information, go to www.bristoluniforms.com



Quadrasonic – The latest innovation in siren technology

Fire engine driver: "Why don't motorists get out of my way – can't they hear my sirens?" Motorist: "Where is that fire engine? – I can hear the sirens but I have no idea where the sound is coming from"

Does this sound like a familiar problem?

This issue affects Fire and Rescue Services throughout the world. In 1977, a United States Government report showed that motorists could only identify the direction of approaching electronic sirens (yelp, howl and wail) 26% of the time.

The problem is worse at junctions and crossroads because the narrow electronic sound beams project forward but not to the side. In built up areas, high pitched electronic siren sounds bounce off buildings and give a false impression of the fire engine's true direction of approach.

Jez Brandon – Inventor and Dan McCullough – Production Engineer at Fire and Rescue Sirens Ltd have solved this problem. Many years of experience building acoustic devices enabled them to develop the Quadrasonic[™] siren system for Fire and Rescue Vehicles.

Brandon says "I live near a busy junction and see fire engines being held up by motorists many times a day. This lengthens response times and increases stress for drivers attending emergencies. Noise levels inside the cab make radio communications difficult and can cause hearing problems for personnel"

The system is a highly advanced form of traditional two-tone sirens and includes tuned enclosures which project the sounds where they are needed.

Brandon and McCullough plan to bring demonstration units to the Emergency Services Show.

For more information, go to www.fireandrescuesirens.com

Tempest VSR Power Blower

The VSR comes to Tempest's line up of Variable Speed, GFCI Compatible Positive Pressure Ventilation fans bearing the highest air output and CFM performance. This is all made possible by the unit's large 2.0 HP motor and Tempest's latest VS Drive. The drive, which is also a recent development from the company, is both GFCI compatible and NEMA 4 rated. Only two controls are needed to operate the VSR, an ON/OFF switch and a 0 – 100% output rheostat knob. Built specifically for convenience and simplicity, this ensures the unit can be deployed quickly and operated safely by just about anyone.

The *VSR* is built on Tempest's original and time tested Power Blower frame design. Featuring all of its exclusive features including a welded roll cage frame, five position tilt dual "Winning Step", durable nonpneumatic wheels, flip-up and fold-down

handle, Airflex impeller, Turbo 2000 shroud and more. This platform has served the fire service for nearly three decades with its well-known reliability, and continues to be the most popular in operation today. If you're looking for the convenience of electric, but the air output more like that of a gasoline driven fan, the VSR is the answer.

Johan Gidstedt, President at Tempest Technology Corp. adds, "High performance electric ventilation just reached a new milestone with the VSR: output near a gasoline unit in an electric package with reliability that only Tempest can bring."

For more information, go to www.tempest.us.com

Cutters Edge introduce the H²



Cutters Edge recently introduced the new H² Series Rotary Rescue Saws which feature more power, improved air filtration, a fullwrap handle and a new EZ-Drag base design.

Tom Ruzich, president of Cutters Edge said; "The H² Series is more operatorfriendly with the full-wrap handle and

textured rubber grip that helps create a solid grip in all cutting positions. The

K&N Filter delivers up to 300% more air, protects the engine from water and never needs to be replaced. The new EZ-Drag Base design enables smooth movement of the saw on roof surfaces."

The new H² Series is available in three models; CE760, CE970 and CE1260. All models are equipped with the Black Diamond Blade and the new BULLETBLADE™ will be available as an option.

For more information, go to www.cuttersedge.com



See how UK fire and rescue crews tackle major incidents

Find out how the UK's fire and rescue services have been responding to new demands with tighter budgets by visiting The Emergency Services Show at the NEC in Birmingham, UK this September.



pen to all ranks throughout the fire and rescue service and industrial brigades, including overseas visitors the two-day event (24th and 25th September) offers live demonstrations, free workshops and an exhibition showcasing cutting-edge equipment, vehicles and technology from around the world.

Stepping Up to New Challenges

Faced with austerity cuts and a need for greater co-operation, the landscape of emergency services is changing. Overseas visitors to The Emergency Services Show can find out how the UK's fire and rescue crews have been stepping up to the new challenges which include increasingly unpredictable acts of terrorism and some of the most devastating storms and floods in its history. Several exhibitors will be exhibiting water rescue craft, all-terrain vehicles, flood barriers and rescue equipment and visitors can meet with search and rescue organisations in the new UK SAR Zone.

Reducing House Fires

Those attending The Emergency Services Show will also gain an insight into how the UK is dealing with fire prevention to drive down house fires. Fire and rescue teams for example are increasingly using software to help identify trends, patterns and problem areas as to where fires are likely to occur and as a result intelligence-led response will feature strongly around the exhibition.

PPE Covered in Free Seminars

Visitors can see first-hand how developments in technology and communications are empowering fire and rescue personnel to do their jobs better in the *Innovation & Technology* seminar theatre. David Frodsham, Product Specialist at W.L. Gore & Associates will present a session on Balancing Thermal Protection and Heat Stress in Firefighter PPE and Malcolm Peattie, Specialist Advisor at the Police CBRN Centre will present on Next Generation CBRN PPE. Other free seminars will cover the latest developments in Body Worn Video (BWV), social media and mobile communications.

Meanwhile the *Interoperability & Collaboration* seminars, developed in partnership with the Joint Emergency Services Interoperability Programme (JESIP), will include case studies presented by category 1 and 2 responders who have worked together attending major incidents.

Global Brands Exhibiting

Panasonic Toughbook is showcasing a number of its Toughbook and Toughpad devices, Draeger UK will be showcasing the HPS 7000 helmet (winner of one of the prestigious iF Product Design Awards 2014)



and Mercedes-Benz will be showcasing the Unimog which features tough, rugged design, powerful low-emission engines, exceptional on & off-road performance and the ability to get crew and their equipment right to the heart of an incident.

Visitors to the Bluecher Group stand can find out more about its SARATOGA® brand protective suits and systems which are in-service in over 40 countries and used by professionals confronted with real CBRN hazards every single day.

Other global brands exhibiting include Godiva, Interspiro, Bristol Uniforms, Ferno, Excelerate, WL Gore, Scott Safety, Serco Fire, Babcock International, Rosenbauer, Jaguar Land Rover, ISG Thermal Imaging, Amdac-Carmichael and SP Services.

Shared Experiences

Visitors attending The Emergency Services Show can share best practice and experiences with fire and rescue services across the world as well as network with other bluelight services and agencies. The Emergency Response Zone sponsored by Draeger UK will feature over 80 secondary responders, voluntary sector partners and NGOs including the British Red Cross, CFOA National Resilience, Defence Fire Risk Management, Government Decontamination Services, Rail Industry Fire Association, The Environment Agency, AA Special Operations and the Flood Forecasting Centre.

Travel Information

The NEC is physically linked to Birmingham International Station and Birmingham Airport and is directly accessible from the UK motorway network. Parking for visitors and exhibitors will remain free of charge.



To register and to see the full seminar programmes visit www.emergencyuk.com

8



gham | 24-25 September 2014 | www.emergencyuk.com | NEC | Birmingham | 24-25 September 2014 | www.emergencyuk.com | NEC | Birmingham | 24-25 September 2014 | www.em

"For cutting edge fire & rescue knowledge this is the Show to attend."

Get updated! The innovation seminars, in association with Vodafone, will cover the latest developments in firefighter and CBRN PPE, social media and mobile communications. West Midlands Fire Service will present software that streams live video from smartphones during 999 calls. All sessions are free and with over 400 key suppliers of kit and services, along with free workshops and demonstrations, The Emergency Services Show covers the entire spectrum and is the only show you need to attend this year. Register for FREE visitor entry at www.emergencyuk.com. See you in September!



NEC | BIRMINGHAM | 24-25 SEPTEMBER 2014 Free visitor entry at www.emergencyuk.com



The Emergency Services Show - Covering the entire spectrum of the Emergency Services



















World Rescue Challenge is coming to the Fire Service College



The World Rescue Challenge (WRC) sees world class rescue teams compete annually in an event designed to challenge emergency service personnel and raise awareness of the global problem of road death and injury.

Up to thirty international teams participate in the challenge each year. Each team consists of six members, the team leader, two medics, two technical rescue personnel and one person responsible for operational support.

A team of international assessors observe Incident Command, Medical and Technical Rescue.

The 2014 World Rescue Challenge will be held in Gloucestershire, England at the Fire Service College, Moreton-in-Marsh from 9th – 12th October.

The Fire Service College (FSC) will join forces with the World Rescue Organisation (WRO) to host the 'World Rescue Challenge 2014' in the UK to provide a platform for rescue and medical personnel to share and advance rescue science and technology.

The four-day event is expected to attract over 300 operational delegates, together with support teams and guests. Over 450 are anticipated for the closing ceremony.

The WRO and FSC will expose the teams to realistic and engaging scenarios

throughout the weekend. These scenarios will be designed around some of the College's practical training areas so that

the intensity and realism further enhances the event.

The challenge scenarios have been designed and agreed by the United Kingdom Rescue Organisation (UKRO) in collaboration with the WRO and for the RTC Extrication Challenge each team will undertake three scenarios:

- Complex lasting 30 minutes
- Limited 20 minutes and
- Rapid 10 minutes

Participants already enrolled include: Englewood Fire Department, Florida Fire and Rescue Service of the Central Bohemia Region – Fire Station Horovice Leduc County Fire Service

Mid Sweden Rescue – Raddningstjansten Medelpad

Victoria State Emergency Service – South Barwon Unit

Miami Dade Fire Rescue Latin American Rescue Team – Asurev TRT Zuchwil Switzerland – Rescue Team Hurstville Fire and Rescue, New South Wales, Australia

Servie Departenmental d'Incendie et de Secours de la Charente-Maritime, France

For more information, go to www.fireservicecollege.ac.uk/up-coming-events/world-rescue-challenge-2014/

Large Diameter Performance Hoses

TEISEN produced its first firefighting hose in 1903 and, since then, it has become the most experienced and largest firefighting hose manufacturer in Japan. Its Super Line LDH

(Large Diameter Hose) is available with a diameter of up to 300 mm and is manufactured using a one-piece construction method, extruding the cover and lining in one step, with polyurethane inside a polyester jacket.

Features of the Super Line LDH include: minimised pressure loss; compact storage thanks to a new kind of rubber-like, polyurethane material; availability in long lengths; and excellent resistance to heat, fuel, chemicals, UV, ozone and weathering.

Five sizes are available, spanning in 50 mm increments from 100 mm to 300 mm diameter, with weights from 1.1 kg/metre to 4.8 kg/metre. Burst pressures are from 4.2 MPa to 2.8 MPa, with maximum working pressures from 1.6 MPa to 1.4 MPa.

For more information, go to www.teisen.co.jp



Unique software is fighting fires before they begin

County Durham and Darlington Fire and Rescue Service's (DDFRS) Fire Investigation Team have teamed up with Orcuma Ltd to build software to help identify trends, patterns and problem areas as to where fires are likely to occur. FIRsT (Fire Intelligence Reporting Tool) is the first piece of software in the UK designed for fire investigators.

Fire Investigation Manager, Lee Aspery said, "We were looking for a piece of software which would allow our officers to capture and record notes, witness statements and images in a much more efficient way than we could before.

"To keep the public safe we also needed to respond more strategically to problems like arson – understanding developing trends, patterns and problem areas at the earliest opportunity to allow ourselves and our partners to better co-ordinate our efforts and make better use of resources.

"Through working with Orcuma we've been able to design a system which does exactly what a modern fire service needs it to do – we have technology which allows us to automatically compile reports and securely share information between investigators working from 15 stations across Darlington and Durham.

"FIRsT even gives us the power to analyse fire investigations to pick up trends and hot spots".

Orcuma co-founder Richard Whittaker said; "We design innovative customer management software which has positive impacts on people's lives. We've seen dedicated public service professionals struggling to use software which wasn't built with their needs in mind and in FIRsT we have software that will make their processes easier, helping them save lives and better serve their communities.



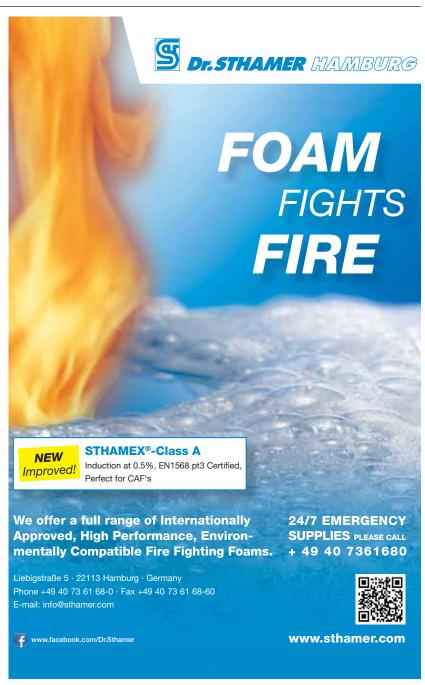
Lee Aspery believes that FIRsT is already making a difference.

He said: "In one recent case after a fire which destroyed a car, our team found that property had been stolen from the vehicle before it was set alight and established the cause of fire as arson. All the evidence was forwarded instantly to the police at the touch of a button – before that could have taken hours or days, in a criminal investigation where every second counts.

"FIRST gives Durham and Darlington Fire and Rescue Service the means to develop 'as live' intelligence on deliberate and secondary fire setting within the communities of County Durham and the Borough of Darlington.

"It also allows Durham and Darlington Fire and Rescue Service to interact in a real time manner with a host of other agencies. Previously, Intelligence gathered by differing agencies was disparate and lacked viable cohesion, not to mention the issues relating to data sharing and security. The software from Orcuma facilitates this data sharing in a secure platform, allowing mapping overlays from differing agencies who need to share common intelligence for the benefit of a safer community."

For more information, go to www.orcuma.com



New facility for Angus

Following a major investment in the Monnex Powder production plant, newly independent fire company Angus Fire International recently opened its enhanced facility.

Angus Fire was delighted that Peter Holland CBE, Government Chief Fire and Rescue Adviser, agreed to undertake the opening ceremony. In addition, Barry Dodd CBE, Chairman of York and North Yorkshire with East Riding LEP was present to support this regional initiative.

Monnex, originally developed by ICI Chemicals, remains the highest performing BC powder available on the market, typically extinguishing flammable liquid fires in a fraction of the time achieved by other powder types. This unrivalled performance continues to be recognised globally with 75% of production being exported outside of the UK and significant



Angus Fire CEO Paul Williams (left) and CFRA Peter Holland

growth expected during 2014.

The Monnex project forms part of the ongoing investment programme at the Angus Fire facility in High Bentham, North Yorkshire following the change in status of Angus Fire to an independent UK Fire

Fighting Company in 2013.

Following a presentation on the recent changes at Angus Fire, CEO Paul Williams accompanied the visitors on a tour of the factory, before the formal opening of the Monnex Plant by Peter Holland.

Following his visit Peter Holland said, "The UK Fire Sector has always had a strong UK Supply Base and there is now a strengthening relationship between the Service itself and its supply partners. It was really exciting to see firsthand a UK manufacturer with an ambitious expansion programme, based on high performance products and a strong export tradition. It was a pleasure to be asked to formally open this new Monnex Powder facility."

For more information, go to www.angusfire.co.uk

New addition to the Rosenbauer fanshop



Rosenbauer is pleased to present all fire service fans and model collectors with the latest highlight in its Fanshop series. This is the PANTHER 6x6 with extinguishing arm for Viracopos Airport in Brazil.

The scale model from Wiking offers every conceivable reason to be delighted, for due to the telescopic HRET (High Reach Extendable Turret) in particular, as far as precision and visual impact are concerned it more than bears comparison with the original.

The model is available now from the Rosenbauer Fanshop at a price of EUR 79 (incl. 20% VAT).

For more information, go to www.fanshop.rosenbauer.com

Skedco European Dealer Day

Felix Trading BV, the European distributor for Skedco products, organised the third European Skedco Dealer Day in Holland recently. Several representatives from Europe visited Holland for a day and a half of hands-on training. Bud and Catherine Calkin, owners of Skedco along with Andy Ma,



came over to support this event. Over 15 nationalities were present for the event with the purpose of the training being to get acquainted with the products and network with other companies who are in same business. It's always interesting to learn how each country handles their business and approaches the rescue market.

Skedco Inc. is a company based in Portland, Oregon USA selling rescue equipment all over the world and is well-known in the rescue business. The most famous products are the Sked® Stretcher and Oregon Spine Splint (OSS), the original and still the best solution for confined space, high angle or technical rescue. Felix Trading is the European distributor for Skedco products and located in the Netherlands.

During the event Skedco gave briefings on all new products such as the Bariatric Stretcher, and the Patient Simulator which can solve many of the problems that rescue trainers encounter with mannequins. The Patient Simulator is a bladder made of a very rugged material where the bladder is filled with water to simulate a patient's weight. When empty it only weighs a few pounds and it can be folded for ease of storage.

The Sked®, Oregon Spine Splint, Tripod and TerrAdaptor, a new and versatile portable anchor system developed by Skedco and two other US companies was also demonstrated followed by a more interactive session with products such as the Haz-Mat/Hospital Sked and Half-Sked.

For more information, go to www.skedco.com



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- •AS/NZS 4067: 2012
- •EN 443: 2008; EN 14458: 2004
- •NFPA 1971: 2013
- •AS/NZS 1337.1/2010

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Vessel Fire Plans

Tom Guldner

n my previous article entitled, 'Shipboard Basics' I mentioned that one of the first things a firefighter should do when boarding a ship for a fire or emergency is to secure a copy of the vessel's Fire Plan. I indicated that this Fire Plan could be found in tubes or watertight containers on each side of the main deck where you normally board the ship. This plan is vital to any fire operation as it illustrates the construction, firefighting, and safety features found aboard that particular ship.

At first glance these plans can be intimidating to the non-mariner. Numbers and icons are covering the layout of each deck. It is less confusing if you realise that the plans have a 'Legend' printed right on the page which explains what each of the icons represent. The International Maritime Organisation (IMO) dictates how each icon is to be drawn so there is a common legend on each plan.

An example of sample legend can be seen in figure 1. There are many more icons that can be found on a ship's plan and we will look at some of these in this article. The icons listed will be found on the drawing of the ship's deck which will also appear on the same page. As mentioned the icon may be for firefighting, escape, ship construction features, and several other categories.



Figure 1

This legend lists firefighting appliances and features which might aid the firefighting effort. Once you see an icon in a specific location on the ship's plan you can consult this legend to find out what that icon represents. These same icons should also appear painted on the vessel near the item it represents.

Some icons may be simple such as the one shown in figure 2. It is a fire hose



Figure 2

station similar to what you might find in a commercial occupancy or a hi-rise building. The 'W' indicates that it is supplied by water. That is also why there is a GREEN band at the bottom. The rules for this icon state:

'Indicate the hose length at the right side of the symbol; (where only one type of hose is used, the information can be shown in the legend). Extinguishing media should be colour-coded in the lower part of the symbol and indicated by a letter on top of the symbol as follows: yellow – F for foam, white – P for powder, green – W for water.'

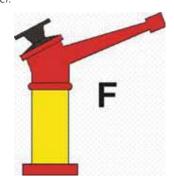


Figure 3

That same colour coding can be found on other icons. Many firefighting appliances aboard will be colour coded to indicate just what firefighting media is used by that appliance. Another example of this is the fire monitor which is shown in figure 3. This is the icon you would see on the ship's fire plan. In this case the YELLOW colour at the bottom indicates that this is a FOAM monitor. The added letter 'F' re-enforces that this monitor is in fact a foam monitor.

If it had the letter 'P' we would expect

the bottom color to be WHITE and this would indicate that we were looking at a monitor being supplied with a POWDER firefighting media. These are found on Liquid Natural Gas (LNG) ships and other special hazard vessels.

OK, those were fairly simple. How about the one in figure 4?

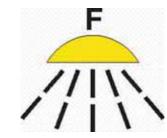


Figure 4

No, it does not indicate the female showers. It does indicate a 'Space or group of spaces protected by fire extinguishing system.' This description goes on to state that the icon should;

'Indicate type of extinguishing media (CO₂ for carbon dioxide, F for foam, H for gas other than CO₂ (type of gas to be indicated), P for powder, W for water, S for sprinkler or high pressure water extinguishing system) and capacity (kg for gas and powder, litres for water and foam) at the top of the symbol. Add suffix 'L' for fixed local application fire fighting system. Media should be colour-coded in the symbol as follows: grey for carbon dioxide, yellow for foam, brown for gas other than CO₂, white for powder, green for water, orange for sprinkler or high pressure water extinguishing system.'

So we know by both the YELLOW colour and the letter 'F' that this is a FOAM extinguishing system.

There are many more icons for firefighting but lets take a look at some of the

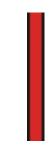


Figure 5

MARINE FIREFIGHTING

structural icons which might appear on the Ships Fire Plan and might also be of interest to a firefighter.

The red bar shown in figure 5 indicates a 'Class A Division'. Class 'A' refers to the fire rating. An 'A' rating would mean a 1 hour division. These may be horizontal or vertical. Main Vertical Zones will be bounded on both sides by these vertical bars.

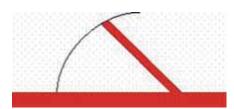


Figure 6

Another Class 'A' rated structural member icon is pictured in figure 6. This indicates a door in a Class 'A Division'.

A second Class 'A' door icon is shown in figure 7. It is very similar to the previous one with one very important exception. The thick black arrow marks this door as a 'self closing' door. If you found the letters 'WT' to the right of this icon that would further indicate that it is a 'Water Tight Self Closing Class 'A' Door'.

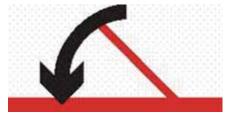


Figure 7

Staying with doors for a moment, figure 8 indicates a Class 'A' sliding fire door. Just as in the previous door if we add an arrow to the icon we would have a 'Self Closing Class 'A' Sliding Fire Door' as shown in figure 9. Also once again, if we add the letters WT to the right side of this icon the door also becomes Water Tight.



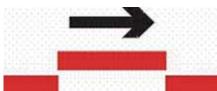


Figure 9

A fire damper, shown in figure 10, may be found in a duct, a door, or a bulkhead. As before, much information can be gleaned by the colours and letters on the icon.

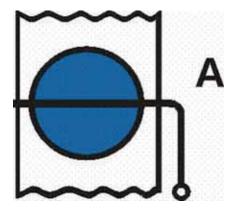


Figure 10

Colour of the circle and a letter at the right side of the symbol should indicate as follows:

A = blue for accommodation and service spaces; M = green for machinery spaces; C = yellow for cargo spaces.

There may also be an Identification number of the damper which may be shown at the bottom of the symbol.

There are many of these symbols but don't worry, you don't have to memorise all of them. They will all be explained at the edge of the fire plan page. When you see an icon you don't understand just consult the legend.

Oh, by the way, there is even a fire plan icon to indicate the location of a copy of the fire plan. This one should not be too confusing and is shown in figure 11. This icon should also appear on the wall next to the fire plan or on a box containing the fire plan. If you board a ship and see this symbol with an arrow on one side or the other of the red bar it indicates the direction to the actual fire plan.

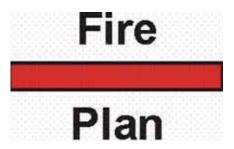


Figure 11

There are numerous details contained on fire plans as can be seen in figure 12. The important information found on these valuable tools can be used to set up fire boundaries, staging areas, areas of refuge, escape routes, or to discharge fixed firefighting systems, to monitor and control flooding, and the list goes on.

Whenever you get the opportunity to get your hands on a copy of a ship's plan use it to set up a fire plan. Also use it at drills to instruct others. For a drill you can choose a location for the fire. Now, you and/or your firefighters should locate all fire doors that will isolate and contain the

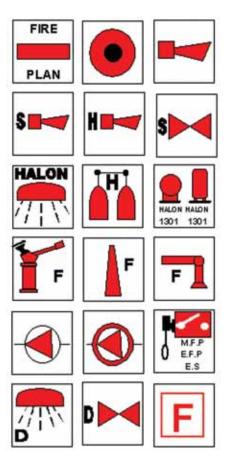


Figure 12

fire. You should also pick your best route and, more importantly, **at least 2-ways out**. Use the icons and the legend to locate all of these items and point them out to the hose teams, search and rescue teams, as well as the F.A.S.T. or RIT teams who may have to rescue your Firefighters should the case arise.

Try to get copies of ship plans for all vessels that regularly visit your port or pass your jurisdiction. Sometimes, if the ship will be at dock for several days you can borrow a copy and bring it to a copying store that handles large pages. You can then return the original to the ship. Now if you respond to a fire on that ship you do not have to try to locate the fire plan. You will already have it.

Until next time, stay safe.

Note: Text in italics from the ISO 17631 Ships and marine technology – Shipboard plans for fire protection

Tom Guldner is a retired Lieutenant of the New York City Fire Department's Marine Division and is a Principal Member of the NFPA Technical Committee on Merchant Vessels. His company Marine Firefighting Inc. is involved in consulting and training mariners and land based firefighters in all aspects of marine fire fighting.

For more information, go to www.marinefirefighting.com

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STACKER TRAILER PRODUCT PROFILE



Stacker Trailer Improves Water Rescue Response Time



Ron Jay

It is no secret that in an emergency situation, mere seconds cans save lives. This small town company had a big idea for a custom-built water rescue trailer that can help improve emergency response time and efficiency, ultimately saving lives.

n 1985 Ron Jay entered the trailer business as a reseller of trailers that were purchased from different manufacturers. He named his business Paxton Trailer and Supply after his home town of Paxton, Nebraska whose current population is 612. In 1991 a friend of his was looking for a double deck trailer and talked Ron into building one for him. He was able to find a trailer pattern and reproduce it. This was the beginning of his involvement in the trailer business as a fabricator. Since then he has changed his company's name to Sport Trailers, Inc. and his son, Travis has joined him in his endeavors. Many changes have also been made to improve and customize the original pattern. The carrying capacity and size keeps getting bigger, and more options are offered. Sports Trailers, Inc. now offers options such as LED lights, hydraulic brakes, wireless operations, electric jacks and winches, sleeker wheels with better tyres, and better finishes such as powder coat or galvanisation. Since 1991, Sport Trailers has built over 400 stacker trailers and more than 1,000 small to large custom trailers. Sport Trailers prides itself on the fact that it custom builds its trailers for the customer, not for the mass market.

Ron and Travis believe in building a relationship with their customers. This mindset is what led to the development of the E-Z Water Rescue Trailer. Each customer comes to them with unique needs and various combinations of equipment loads that they need to haul. No two trailers that they have built have been exactly the same and they enjoy this challenge and attention to detail. Over the years Sport Trailers had several calls asking if they built rescue trailers. However, it was the Osawatomie Fire Department in Kansas that finally got the ball rolling. They were willing to work closely with Sport trailers to develop the unit. Ron was excited about this new idea, "We had professionals that had 'been there and done it' to help with the design. You just can't beat experience." The first responders described what it was that

STACKER TRAILER PRODUCT PROFILE



they were looking for. Sports Trailers was able to accommodate their needs and design the trailer making many changes along the way to come up with a unit that is safe, quick and easy to use.

The Osawatomie Fire Department services approximately 100 square miles of territory situated in eastern Kansas, south of Kansas City. This area is home to several lakes, reservoirs and rivers. The department had been searching online for a water rescue trailer that could streamline their water rescue efforts. Brian Mersman is the deputy chief of the Osawatomie Fire department. He said, "We chose this trailer because Ron and his company were the only company that could build the trailer exactly how we wanted it." The department was looking for a single trailer that could transport two boats. This would help with their limited storage space as well as their efficiency in responding to a water rescue call. Often the situation is unclear until a first responder has had time to visually assess the situation upon arrival at the site, making it hard to prepare at a moment's notice. Therefore, they also needed a trailer that would allow them to remove either boat first, depending on the situation that they were faced with. Sport Trailers set to work in creating the trailer that they needed.

The result of this joint effort was the creation of the efficient and time saving E-Z Water Rescue Trailer. This double deck trailer has a low profile transport mode. Its compact design allows for two boats to be transported with one vehicle, freeing up another rescue worker to prepare for the situation in transit. These details can be vital when faced with a situation where seconds can save lives. The rescue trailer is powered by a 12 volt hydraulic system which raises and lowers the top deck of the trailer. This deck can accommodate a boat, personal water crafts, all-terrain vehicles, motorcycles, etc. Ramps are provided to assist with loading and unloading. With the top deck in the down position, cargo can be loaded. Using the hydraulic system, this deck is raised and locked into place. Then the lower deck is ready to be loaded. Either deck can be unloaded first, giving first responders options when they are faced with an unexpected scenario.

The rescue trailer has many features that are standard, top quality features of Sport Trailers, and many that were added as a result of the collaboration with Osawatomie Fire Department. The rescue trailer has a low profile to accommodate the doors

of the fire department and to allow for easier access to bodies of water that are surrounded by trees and brush. Cargo can be loaded and unloaded with ease. It also features 3 meter door access, remote cordless operation, torsion axles, powder coat finish, custom wheels, a tool box. enclosed wiring and lighting, tubing frame and an electric jack. The finished trailer was also outfitted with Racks for gas, air tanks, life vests and LED emergency lights and signals. The standard size of the E-Z Water Rescue Trailer is 2.6 meters wide by 7.6 meters long. It has 1587 kilogram torflex axles, 38 centimeter radial tires, two 0.8 centimeter couplers and safety chains. The trailer also meets all safety guidelines for the Department of Transportation and comes with a manufacturer's statement of origin.

According to Deputy Chief Brian Mersman of the Osawatomie Fire Department, the finished trailer has served its purpose perfectly and become an integral part of their emergency response plan. The trailer has been used in at least four water rescues to date. One of the rescues included a drowning victim at a lake. The situation called for the department's lake boat to be deployed into the water and the rescue boat to be deployed onto the beach so that they could search the swimming area. They were able to deploy the rescue boat onto land with as much ease as if they were deploying it into the water. Deputy Chief Mersman says, "This trailer helps our response time greatly because we can deploy either boat without taking the other one off. For example, if we need the rescue boat off the top, we do not have to spend any time getting the bottom boat off first. We can take either boat off by itself, possibly saving us the few extra minutes we need to get our victim. I would highly recommend this trailer for any water rescue team as it can save time and increase efficiency."

Other trailer companies were able to promise the Osawatomie Fire Department that they would be able to unload the bottom boat "in a matter of minutes" and then have access to the top boat, but this was unacceptable to them. They kept searching and found Sport Trailers, Inc. "Ron and his company were the only trailer company that was able to build it so that we could deploy the top boat without taking the bottom one off first. I believe this is the first trailer like this to be built and it came out just like we expected." There are other companies who have made units to transport different toys and tools, but as far as Ron Jay knows Sport Trailers, Inc. is the only one that custom builds this equipment on a regular and routine basis.



This article was co authored by Elizabeth Gleason and Ron Jay

For more information, go to www.sporttrailersinc.com



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Craig Shelley





Sue Tarantino

In today's fire service we tend to focus our pre-planning and training for the "bread and butter" operations that we encounter daily. These "bread and butter" operations are generally single and double residential structure fires, multiple family structure fires, hi-rise commercial and office fires, and assorted emergencies that we encounter frequently. We are creatures of habit and feel most comfortable with what we respond to most frequently. While these incidents are usually high frequency/low to medium risk incidents, this tends to be our focus. We are sure that most jurisdictions have industrial and commercial facilities that the firefighters pass frequently without giving them a passing glance. It is fires and emergencies at these facilities that we classify as low frequency/high risk events.

ne type of facility that we would like to focus on in this series of articles is the petroleum storage tank facility. We rarely hear of a storage tank fire today, because the industry has improved on the design, construction, and fire protection requirements for these facilities. It is interesting to note that over the years the number of fires in storage tank facilities has decreased, but the actual tank sizes have increased. The larger tank sizes actually increase the hazard. A fire in these larger tanks can be extremely disruptive to business continuity, costly in terms of property damage, create environmental issues, affect interstate commerce and create negative public opinion. When a storage tank fire involves the full surface of the product contained within the tank (hereafter called 'full surface fire'). it will require a large commitment of resources, both equipment and human, and will require an extensive logistics structure. On a positive note, the improvements to the various codes and standards developed and maintained by the American Petroleum Institute (API) and the National Fire Protection Association (NFPA), along with proper enforcement of these standards and codes by the authorities having jurisdiction, have reduced these incidents to the lowest levels in decades.

The above mentioned bulk storage tank facilities can be located almost anywhere, from large refinery and petro-chemical plants to smaller bulk storage plants with loading terminals. In between we may have large marine terminals and smaller ethanol refining facilities. In this series of articles we will focus on the types of storage tanks, fire suppression systems, firefighting operations, and pre-incident response planning.

Types of Storage Tanks

In this article we will focus on above ground atmospheric petroleum storage tanks. These tanks range from diameters of 3.048 meters (10 feet) to over 106.68 meters (350 feet). In some instances, there are tanks exceeding 121.92 meters (400 feet). Average heights for above-ground tanks are 13.72 meters (45 feet). Tanks may be in individual dike areas or may have multiple tanks within one dike. Dikes, or bunds as they are also referred to are physical barriers or dividers used to prevent the spread of tank contents in the event of a tank overflow or tank rupture.

There are several types of above ground atmospheric storage tanks. For this article we concentrate on the following types, typically found at bulk storage facilities:

- Cone roof and dome roof tanks
- Open top floating roof tanks
- Covered floating roof tanks including geodesic domes
- Vertical low-pressure storage tanks
- Horizontal Storage Tanks

The types of tanks used to store flammable and combustible products are generally determined by the physical characteristics of the product being stored, however, this may not always be the case. There have been instances where products have been stored in tanks not intended for the particular product.

Cone or Dome Roof Tanks

Cone roof and dome roof tanks are similar with the difference being the shape of the roof. Cone roofs have a cone shape, but depending on the slope of the roof, the cone shape may not be

BULK STORAGE TANK FACILITIES



Cone Roof Tanks – note the difference in roof shapes

evident from the ground. These tanks will have a vapor space between the product surface and the underside of the roof. If this vapor space is in the explosive range and an ignition source is introduced, an explosion will occur. Generally, these tanks are used to store liquids with a flashpoint of 37.8°C (100°F) or higher, however, there have been instances where liquids with lower flashpoints have been stored in such tanks and the vapor space has ignited.

These tanks are equipped with a pressure/ vacuum relief device to allow the internal pressure to nearly equal the external atmospheric pressure. They may also have open vents. These devices allow the tank to "breathe" during loading, unloading, and extreme changes in temperature resulting in a change of the pressure in the vapor space. Cone and dome roof tanks will also have a weak roof-to-shell seam. In the event of an incident such as internal overpressure from an explosion or similar incident, the roof will separate from the vertical shell, thus preventing the failure of the bottom seams and a resultant tank rocketing event. Flame arrestors may also be found to prevent the introduction of a spark to the vapor space through vents or pressure/vacuum relief devices.

Open Top (External) Floating Roof Tanks

Open top floating roof tanks are vertical steel cylinders with a roof that floats on the surface of the liquid in the tank but it is open to the atmosphere above. The roof moves up and down inside the tank shell with the product. This floating roof's



Open Top Floating Roof Tank – note the presence of the wind girder just under the open top

advantage is that there is no vapor space between the liquid and the roof as in a cone roof tank. These roofs float on pontoons or have a doubledeck for floatation on the liquid's surface.

These tanks can be distinguished from a cone roof tank by the presence of a wind girder that rings the top of the tank. The wind girder acts as a stiffening ring for the top of the tank, giving it additional structural support. Between the shell of the tank and the roof edge, a rim seal will be provided to prevent vapors from escaping to the outer air. The rim seal area is considered to be the space between the tank shell wall and the floating roof edge. This distance may be 0.30 meters to 1.21 meters (1 foot to 4 feet). Open top floating roofs generally carry low flash point liquids which have high vapor pressures.

While the roofs of these tanks are designed for carrying a specific live load plus additional loads created by rain and snow, they can fail if the load exceeds the designed limits. To prevent the excessive load, the roofs are designed with a drainage system to remove normal rain water from the roof to the ground where it can be collected inside the dike area. In the event the drain system fails, or is overwhelmed by severe weather, the load can partially or fully sink the roof. When this happens the product is exposed to the atmosphere and vapors are released, subjecting them to possible ignition.

Covered (Internal) Floating Roof Tanks



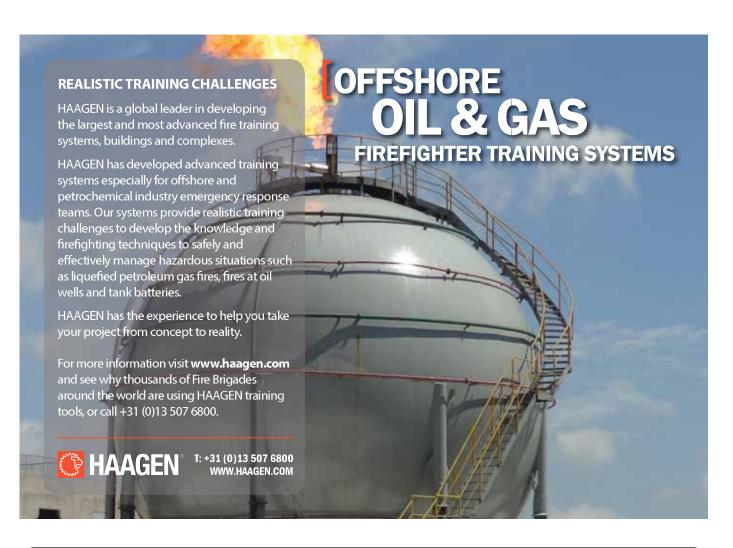
Covered Floating Roof Tank – note the 'eyebrow' vents near the tank top

These tanks exhibit the same basic construction features as the open top floating roof tanks but with the added feature of a fixed roof at the top of the tank. The fixed roof may be self supporting or may have vertical supports within the tank. These tanks also have a rim seal to prevent the escape of vapors from the liquid. The fixed roofs of these tanks are freely vented with the expectation that any vapors in the space above the floating roof will be below the flammable limit.

Covered floating roof tanks have distinguishing "eyebrow" vents at the top of the tank shell. These vents allow air to escape and enter the inside space between the fixed roof and the internal floating roof as it moves up and down inside the tank shell.

Domed External Floating Roofs

Domed external floating roof tanks are similar to covered floating roof tanks but instead of a steel roof, a much lighter roof structure is installed on an existing open top floating roof tank. These



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BULK STORAGE TANK FACILITIES



Domed External Floating Roof Tank next to Vertical Low Pressure Tank

Battalion Chief (ret)

Chief (ret) Craig H. Shelley

Craig is a 45-year veteran of

the fire service. He served

has performed petroleum

consulting throughout the

world, most recently for

major oil companies in

Libya and Brazil where comprehensive analysis' of

Currently, Craig is an

Assistant Chief with

the CEO of World Safe

International.

process, storage and marine facilities were conducted.

Industrial Emergency Services

(IES) and Manager of Marine Operations. In addition, he is

industry and marine

with the FDNY for 26 years retiring as the Chief of Marine Operations. Craig

FIFireE, CFPS

Sue Tarantino BS, MBA Sue is a retired 27-year veteran of the Charlotte (NC) Fire Department. Sue served as a Battalion Commander for 12 years, during which time she supervised the operations of the hazardous materials company. She is currently a Division Chief with Industrial Emergency Services (IES) and Assistant Manager of Marine Operations. She also serves as a senior fire protection specialist with World Safe International, LLC teaching flammable liquids firefighting and performing consulting work in storage tank facilities and other industrial complexes.

For more information, go to www.worldsafeinternational. com

roofs are often referred to as geodesic dome tanks. The dome serves to provide a barrier to the wind and rain and may also provide environmental control with respect to fugitive emissions.

Vertical Low Pressure Storage Tanks

These tanks have relatively simple features. They are cylindrically shaped with a top and bottom. They will have some form of pressure/vacuum device. These tanks are generally smaller than cone roof tanks and generally used in process areas or specialty storage areas.

Horizontal Storage Tanks

Above ground horizontal storage tanks are normally smaller capacities, 151,400 liters (40,000 gallons) or less and are used primarily for storing flammable and combustible liquids.

Locations of Storage Tanks

The above-mentioned storage tanks can be found at many locations within fire districts. Locations that are most common are refineries, petrochemical facilities, bulk storage plants, airports and marine terminals. This list is not all inclusive and many smaller facilities may have storage of flammable and combustible liquids. This series of articles focuses on larger facilities where the number and spacing of tanks, or the volume of the tanks creates a severe fire hazard.

Too many times these facilities with their tanks become just "part of the landscape" within our districts. As mentioned previously the fire service tends to focus on our "bread and butter" operations, and ignore the low frequency events. It is imperative that we notice these facilities, pre-plan them, and learn as much as we can about the facility, product, processes, and the fire protection or lack thereof in a facility.

Fire Hazards

The following are some of the hazards associated with the various types of storage tanks:¹

Fixed (Cone Roof) Tanks

- Vent fire
- Overfill ground fire
- Unobstructed/obstructed full surface fire

Open Floating Roof Tanks

- Rim seal fire
- Overfill ground fire
- Unobstructed/obstructed full surface fire

Internal (Covered) Floating Roof Tanks

- Vent fire
- Overfill ground fire
- Obstructed rim seal fire
- Obstructed full surface fire

Domed External Floating Roof Tanks

- Vent fire
- Overfill ground fire
- Obstructed rim seal fire
- Obstructed full surface fire

Vertical Low Pressure Tanks

- Vent fire
- Overfill ground fire
- Obstructed full surface
- Tank explosion and failure preceded by ground fire
- Tank explosion and failure with resulting ground fire

Horizontal Tanks

- Vent fire
- Overfill ground fire
- Tank explosion and failure preceded by ground fire
- Tank explosion and failure with resulting ground fire

The above listings may occur alone or in combination with each other. For instance, you may have a full surface fire in a tank and at the same time have a ground fire in the dike area. Our next article will focus on the types of fires in depth and the fire protection methods available followed by a third article which will give firefighting strategies and tactics as well as pre-incident planning guidelines.

¹American Petroleum Institute [API]. API Recommended Practice 2021: *Management of Atmospheric Storage Tank Fires*. Washington, DC: API, 2001, Reaffirmed 2006



Introduction

TEISEN produced its first firefighting hose in 1903, and since then, it has been the most experienced and largest firefighting hose manufacturer in Japan.

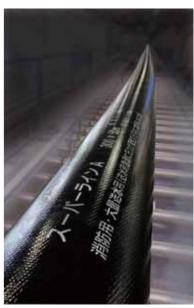
Super Line Large Diameter Hoses

TEISEN offers the Super Line LDH with a diameter of up to 300mm. Super Line LDH is manufactured using a one-piece construction method, extruding the cover and lining in one step, with polyurethane through a polyester jacket.

Features

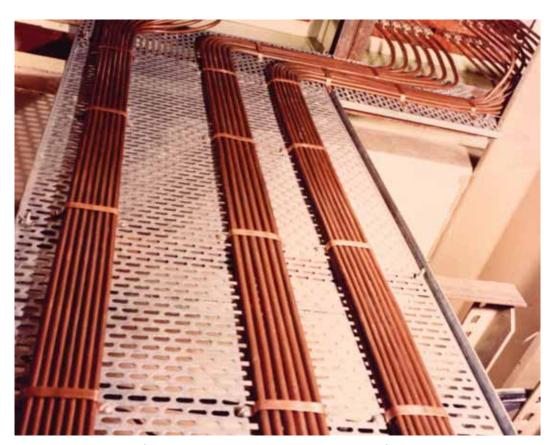
- Minimized pressure loss
- •Compact storage through a new kind of rubber-like, polyurethane material
- Available in long lengths
- •Excellent resistance to heat, fuel, chemicals, UV, ozone, weathering, etc.





Diameter	mm	100	150	200	250	300
	inch	4.0	6.0	8.0	10.0	12.0
Color		orange	orange	orange	black	black
Wall thickness	mm	3.5	3.5	4.0	4.6	5.0
Weight	kg/m	1.1	1.6	2.8	4.0	4.8
Burst pressure	MPa	4.2	4.4	3.6	3.0	2.8
Maximum working pressure	MPa	1.6	1.6	1.4	1.4	1.4
Temperature range	°C	-20°C∼50°C				

Fire performance o





Richard Hosier

Electrical cables are frequently blamed by the media and fire authorities as the cause of building fires however it is often not the failure of the cable which starts a fire but the misuse of the cable by frayed or damaged insulation, overloading due to incorrect or insufficient circuit protection, short circuit or over voltage. These situations can cause high temperatures in the cable conductors or electrical arcing which may heat the cable insulation and any surrounding combustible materials to start a fire.

able manufacturers generally endeavour to manufacture electric cables which under the above situations, or in cases where a fire is started by another unrelated cause, will not burn or at least will not help spread a fire through the building.

Today there are various cable flame retardance test standards written by technical standards committees in Europe and USA. These common standards propose test methods intended to determine if the electric cables or materials they are made from are self-extinguishing (Flame Retardant). These test methods may also be embedded by Authorities into mandatory building design codes.

This article takes a look at the common test methods and questions if the test protocols employed do in fact provide the implied level of flame retardance performance when cables are installed and used in buildings.

Making flexible electric cables

Most common flexible cables are made from hydrocarbon based polymers. These base polymers are not usually flame retardant and have a high calorific value so chemicals are added to make them more suited to electrical cable use. Halogens like Chlorine are particularly good additives which help retard flame propagation and don't significantly impact the dielectric properties of the polymer so Halogens can be used in both cable insulations and in cable sheaths. These halogenated polymers (example: PVC & CSP) also have a negative side effect that in fire they can release the halogens which are extremely toxic and when combined with the moisture in eyes, mouth and lungs are very irritant.

For cables which need to be 'Halogen Free' and 'Flame Retardant' other non-halogen flame retarding elements like alumina-trihydrate (ATH) can be used instead of Halogens, but while effective in retarding flame propagation these fillers often negatively affect the polymer by reducing dielectric performance or affecting mechanical and water resistance. For this reason additives like ATH are mostly used only in cable jackets. Halogen Free Flame Retardant cables most often use a more pure polymer like PE, XLPE or EPR for the insulation which has good dielectric and mechanical properties but may not be very flame retardant.

f Electric Cables

Electric Cables: Propagation performance in fire

Often the best flame retardant cables are halogenated because both the insulation and outer Jacket are flame retardant but when we need Halogen Free cables we find it is often only the outer jacket which is flame retardant and the inner insulation is not.

This has significance because while cables with a flame retardant outer jacket will often pass flame retardance tests with external flame, the same cables when subjected to high overload or prolonged short circuits have proved in university tests to be highly flammable and can even start a fire. This effect is known and published (8th International Conference on Insulated Power Cables (Jicable'11 – June 2011) held in Versailles, France) so it is perhaps surprising that there are no common test protocols for this seemingly common event and one cited by both authorities and media as cause of building fires.

Further, in Flame Retardant test methods such as IEC60332 parts 1 & 3 which employ an external flame source, the cable samples are not pre-conditioned to normal operating temperature but tested at room temperature. This oversight is important especially for power circuits because the temperature index of the cable (the temperature at which the cable material will self-support combustion in normal air) will be significantly affected by its starting temperature i.e.: The hotter the cable is, the more easily it will propagate fire.

It would seem that a need exists to re-evaluate current cable flame retardance test methods as these are commonly understood by consultants and consumers alike to provide a reliable indication of a cables ability to retard the propagation of fire.

If we can't trust the Standards what do we do?

In the USA many building standards do not require halogen free cables. Certainly this is not because Americans are not wisely informed of the dangers; rather the approach taken is that: "It is better to have highly flame retardant cables which do not propagate fire than minimally flame retardant



some of the flame propagation tests for cables in USA leading to the conclusion that common tests in UK and Europe may simply be tests the cables can pass rather than tests the cables should pass.

Conclusion

For most flexible polymeric cables the choice remains today between high flame propagation performance with halogens or reduced flame propagation performance without halogens.

Enclosing cables in steel conduit will reduce propagation at the point of fire but hydrocarbon

"It is better to have highly flame retardant cables which do not propagate fire than minimally flame retardant cables which may spread fire" – (a small fire with some halogen may be better than a large fire without halogens).

cables which may spread a fire" – (a small fire with some halogen may be better than a large fire without halogens). One of the best ways to make a cable insulation and cable jacket highly flame retardant is by using halogens.

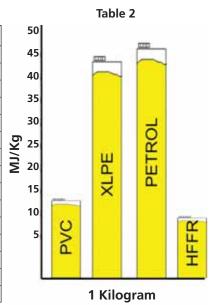
Europe and many countries around the world adopt a different mentality: Halogen Free and Flame Retardant. Whilst this is an admirable mandate the reality is rather different: Flame propagation tests for cables as adopted in UK and Europe can arguably be said to be less stringent than

based combustion gasses from decomposing polymers are likely propagate through the conduits to switchboards, distribution boards and junction boxes in other parts of the building. Any spark such as the opening or closing of circuit breakers, or contactors is likely to ignite the combustible gasses leading to explosion and spreading the fire to another location.

While MICC (Mineral Insulated Metal Sheathed) cables would provide a solution, there is often no singe perfect answer for every installation so

Table 1

Common Name	Description	MJ/Kg
Petrol		48
XLPE	Polyethylene	46
PP	Polypropylene	46
Nylon 66	Polyamide	33
EPR	Ethylene propylene rubber	28.5
CSP	Chlorosulphonated polyethylene	28
Coal		25
PCP	Polychloroprene rubber	24
Wood		18.5
PVC	Polyvinyl chloride	18
SIR	Silicone Rubber	15.5
ETFE	Ethylene tetrafluoroethylene	13.8
HFFR	Halogen Free Flame Retardant	13
PTFE	Polytetrafluoroethylene	5
MICC	Bare Mineral Insulated Metal Sheathed	0



designers need to evaluate the required performance on a "project-by-project" basis to decide which technology is optimal.

The primary importance of fire load

Inside all buildings and projects electric cables provide the connectivity which keeps lights on, air-conditioning working and the lifts running. It powers computers, office equipment and provides the connection for our telephone and computers. Even our mobile phones need to connect with wireless or GSM antennas which are connected to the telecom network by fiber optic or copper cables. Cables ensure our safety by connecting fire alarms, emergency voice communication, CCTV, smoke shutters, air pressurization fans, emergency lighting, fire sprinkler pumps, smoke and heat detectors, and so many other features of a modern Building Management System.

Where public safety is important we often request cables to have added safety features such

as flame retardance to ensure the cables do not easily spread fire, circuit integrity during fire so that essential fire-fighting and life safety equipment keep working. Sometimes we may recognize that the combustion of electric cables produces smoke and this can be toxic so we call for cables to be Low Smoke and Halogen Free. Logically and intuitively we think that by requesting these special properties the cables we buy and install will

Because cables are installed by many different trades for different applications and are mostly hidden or embedded in our constructions, what is often not realized is that the many miles of cables and tons of plastic polymers which make up the cables can represent one of the biggest fire loads in the building. This point is certainly worth thinking more about.

PVC, XLPE, EPR, CSP, LSOH (Low Smoke Zero Halogen) and even HFFR (Halogen Free Flame Retardant) cable materials are mostly based on

> hydrocarbon polymers. These base materials are not generally flame retardant and naturally have a high fire load. Cable manufacturers make them flame retardant by adding compounds and chemicals. Certainly this improves the volatility of burning but the fuel content of the base polymers remains.

Tables 1 and 2 above compare the fire load in MJ/Kg for common cable insulating materials against some common fuels. The Heat Release Rate and volatility in air for these materials will differ but the fuel added to a fire per kilogram and the consequential volume of heat generated and oxygen consumed is relative.

The volume in kilometers and tons of cables installed in our buildings and the associated fire load of the insulations is considerable. This is particularly important in projects with long egress times like high rise, public buildings, tunnels and



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underground environments, airports, hospitals etc.

When considering fire safety we must first understand the most important factors. Fire experts tell us most fire related deaths in buildings are caused by smoke inhalation, temperature rise and oxygen depletion or by trauma caused by jumping in trying to escape these effects.

Smoke

The first and most important aspect of smoke is how much smoke? Typically the larger the fire the more smoke is generated so anything we can do to reduce the spread of fire will also correspond-



ingly reduce the amount of smoke.

Smoke will contain particulates of carbon, ash and other solids, liquids and gasses, many are toxic and combustible. In particular, fires in confined areas like buildings, tunnels and underground environments cause oxygen levels to drop, this contributes to incomplete burning and smoldering which produces increased amounts of smoke and toxic byproducts including CO and CO₂. Presence of halogenated materials will release toxic Halides like Hydrogen Chloride together with many other toxic and flammable gasses in the smoke.

For this reason common smoke tests conducted on cable insulation materials in large 3 meter³ chambers with plenty of air can provide misleading smoke figures because complete burning will often release significantly less smoke than partial incomplete burning which is likely in practice. Simply specifying IEC 61034 with a defined obscuration value then thinking this will provide a low



ELECTRIC CABLES

smoke environment during fire may unfortunately be little of help for the people actually involved.

Halogens, Toxicity, Fuel Element, Oxygen Depletion and Temperature Rise

It is concerning that Europe and other countries adopt the concept of halogen free materials without properly addressing the subject of toxicity. Halogens released during combustion are extremely toxic but so too is carbon monoxide and this is not a halogen gas. It is common to call for halogen free cables and then allow the use of Polyethylene because it is halogen free. Burning Polyethylene (which can be seen from the table above has the highest MJ fuel load per Kg of all insulations) will generate almost 3 times more heat than an equivalent PVC cable. This means is that burning polyethylene will not only generate almost 3 times more heat but also consume almost 3 times more oxygen and produce significantly more carbon monoxide. Given carbon monoxide is responsible for most toxicity deaths in fires this situation is at best alarming!

The fuel elements shown in the table above indicate the amount of heat which will be generated by burning 1kg of the common cable insulations tabled. Certainly this heat will accelerate the burning of other adjacent materials and may help spread the fire in a building but importantly, in order to generate the heat energy, oxygen needs to be consumed. The higher the heat of combustion the more oxygen is needed, so by choosing

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insulations with high fuel elements is adding significantly to at least four of the primary dangers of fires: Temperature Rise, Oxygen Depletion, Flame Spread and Carbon Monoxide Release.

Perhaps it is best to install polymeric cables inside metal conduits. This will certainly help flame spread and minimize smoke because inside the conduit oxygen is limited; however this is not a solution. As said previously, many of the gasses from the decomposing polymeric insulations inside the conduits are highly flammable and toxic. These gases will migrate along the conduits to junction boxes, switch panels, distribution boards, motor control centers, lamps, switches, etc. On entering the gases can ignite or explode with any arcing such as the make/break of a circuit breaker, contactor, switch or relay causing the fire to spread to another location.

Conclusion

The popularity of "Halogen Free" while ignoring the other toxic elements of fire is a clear admission we do not understand the subject well nor can we easily define the dangers of combined toxic elements or human physiological response to them. It is important however, that we do not continue to design with only half an understanding of the problem. While no perfect solution exists for organic based cables, we can certainly minimize these critically important effects of fire risk:

One option maybe to choose cable insulations and jacket materials which are halogen free and have a low fuel element, then install them in steel conduit or maybe the American approach is better: to use highly halogenated insulations so that in case of fire any flame spread is minimized.

For most power, control, communication and data circuits there is one complete solution available for all the issues raised in this paper. It is a solution which has been used reliably for over 80 years. MICC cables can provide a total and complete answer to all the problems associated with the fire safety of organic polymer cables.

The copper jacket, magnesium oxide insulation and copper conductors of MICC ensure the cable is effectively fire proof. MICC cables have no organic content so simply cannot propagate flame or generate any smoke. The zero fuel load ensures no heat is added and no oxygen is consumed.

Being inorganic MICC cables cannot generate any halogen or toxic gasses at all including CO.

Unfortunately many common cable fire test methods used today may inadvertently mislead people into believing the polymeric flexible cable products they buy and use will perform as expected in all fire situations. As outlined in this paper, sadly this may not be correct.

Richard Hosier is Sales Director in Singapore and Malaysia for the TRM & MICC Group, based in Singapore. He has been working in the electrical cable industry for thirty years specialising in the fire performance of cables. He has lectured at institutions, universities and has published several technical papers as well as serving on three Australian and New Zealand technical standards committees for cables and fire performance wiring systems.

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The Team Approach to Road Traffic Collisions



Paul Maynard

In my previous article I spoke about the role of the Incident Commander at an RTC or Extrication Challenge but also touched on how important the team approach is. As I have stated, for the Team to be effective there is a lot of pre planning and training that must take place in the classroom and drill yard but everyone must know the stages inside out for all crews to be truly effective.

The team approach is well documented in the Fire and Rescue Manual (Incidents Involving rescues from Road Vehicles) and more recently in the excellent publication from Ian Dunbar (Vehicle Extrication Techniques) which offers more modern techniques in line with today's vehicles. In both publications the team approach is still the same and focuses on the 6 key elements of a structured rescue.



- 1. Safety and Scene Assessment
- 2. Stability and Initial access
- 3. Glass Management
- 4. Space Creation
- 5. Full Access
- 6. Immobilisation and Extrication

I am going to look at each of these areas and going to give some practical tips and techniques on each area that have always served me well both on the road and at Challenges. These will all be applicable for a crew or extrication team and can be used with 4, 5 or 6 people depending on how many you have on the appliance/team. Obviously the less people on the first appliance then you will have to adapt as required though the most important thing to remember throughout the whole evolution is that it must be "patient focussed".

The roles at an RTC are as follows:

- 1. Incident Commander
- 2. Medic
- 3. Technical Operator 1
- 4. Technical Operator 2
- 5. Medic/tech back up

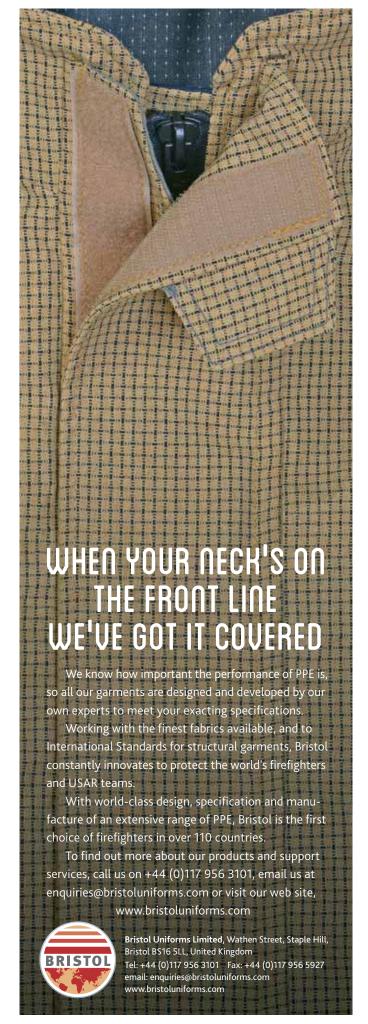
The beauty of the Team Approach is that it allows everyone to know each other's roles and if anyone has a particular skill such as extra medical experience then is doesn't matter where they are on the appliance, your specific pre planning will allow them to fit seamlessly into that role.

You may well find that due to any number of reasons such as access or the patient injuries that the order cannot be followed prescriptively. This doesn't matter as long as you remember to consider them all at some point as this will ensure nothing is missed.

For the sections below I am going to assume that there is no paramedic in attendance however, if there is, you just incorporate them into your plan and must still have the same discussions/information gathering conversations with them.

Safety & Scene Assessment

As soon as you arrive, the team approach takes over. The IC must complete a full 360 outer survey taking the medic with him if possible, as this will ensure you both see all the hazards, the location of the patients and an idea of the kinematics. Look at the vehicles involved; are they old cars with glass that will cut out and a couple of airbags or new BMW's with a vast range of SRS and difficult



glass. Are they hybrid, LPG or single fuel, are they on their roof/sides or is there anything else involved.

Once this is completed, hold your medic at an appropriate point where they can communicate with the patient, then carry out a very brief inner survey to look for further hazards. By completing an inner and outer survey, you will gain maximum info to start forming a plan. Briefly confirm hazards with the medic and get them to work making sure you get a name, any injuries and entrapment as soon as possible!! Now brief your techs on the hazards, who will have the correct stabilisation ready and waiting and get them to work. This should all happen within a minute or so!

Stabilisation & Initial Access

Pre-planning will ensure that the tech operators must have a systematic approach to stabilising the vehicle whether it is on its roof, side or wheels. There are many ways and techniques to stabilise vehicles, however, the key is being able to use what you have in your FRS efficiently and again lan Dunbar's book makes good reference to these.

While they are stabilising, it is also a good time for them to gather anymore information that will assist them and my plan. My pre-planning on this is that one would do the inner survey and one would do the outer survey and to me this is vital as and I would be looking for:

Outer Survey

- Confirmation of fuel type
- Hazards
- Glass type
- Boot and battery access
- Any openings both doors and windows Inner Survey
- Confirm entrapment (see below)
- Seating plan and any intrusions (see below)
- Confirm all SRS
- Kevs
- Handbrake
- Boot and bonnet releases

Any entrapment must be confirmed along with a technical solution, this is vital and if not considered early by all can hamper the plan later on. Just as important is the seating plan. By this, I need to know are the seats electric/manual, do they/can they recline, is the B post in the way, are there airbags in the seats. All these will have a bearing on my plan and final extrication pathway.

Whilst this is happening, it gives you time to get any further information from the medic and to start formulating a plan around this, depending on what access is available. Access may have to be a priority and have to be achieved at the same time as stabilisation. When talking about initial access, at this point it is for the medic to get an airway or at least hands on. As part of this he should also look at where he wants/needs to be after discussion with the IC.

As soon as stabilisation is finished and checked you should call everyone in, receive their inner and outer survey reports, factor these in and then deliver your plan. If your crew are well trained, communicating the plan is easy and only needs to consist of the main plan and emergency exit, as well as any space creation that is required to ensure this is viable i.e. roof off and plan 'B'.

It is always worth asking if anyone has any other ideas as there may be something you have missed.

Glass Management

On delivering the plan I always like to see the tech team discuss who is doing what as depending on the plan not all glass needs to be removed, just managed. By using tools available today such as Packexe Smash and Speedings Ltd glass and door sheets and the Rhyno cutter, this has never been easier. Having said that, there is great skill in using all of these and they must be rehearsed regularly!

As an example if you are taking a post off with the door still on you can wind the glass into the window and put tape over it or just Packexe it and leave it in situ. This just saves time and prevents the glass becoming a hazard.



Space Creation

This is a key area which is often misunderstood and ideally must be incorporated into the plan. This is purely around taking away any entrapment for the patient and may be as simple as removal of a door but may be more complex such as cross ramming or a dash roll.

I always look at this in two ways not only for the patient but also for the medics in the vehicle and again I will use manual space creation and that created by using tools.

My first attempt at this is when I get the medic into the vehicle. If appropriate, I would expect him to spend 30 seconds on opening/unlocking doors, pulling boot/bonnet releases, getting the keys and winding any seats down. This will save a lot of time and effort for the technical crews.

Your space creation should start to become your full plan and ideally if you have enough crew this must be carried out simultaneously. The nature of removing any entrapment from around a patient often needs to be carried quickly and the ram is excellent for this. Often due to a lack of





ROAD TRAFFIC COLLISIONS



space this can be awkward, so try using straps to hold it in place (piece of old seatbelt is fine) and if you can't get a block in, just go off the seat cushion, there will be metal underneath somewhere!

Although we have a vast amount of hydraulic tools at our disposal don't forget the old school methods of pedal removal by using the seatbelt and the door!

Full Access

Once we have an emergency exit and have created space for this to be viable it is onto full access.

The question is often asked "well how much space should we create?"

Immobilisation & Extrication

This is all about the safe removal of the patient via the long board and generally straight to the waiting stretcher and handed over to the attending paramedics. Immobilising the patient can mean using collars and KED's etc. Not all FRS carry these and there is now good guidance on the use of collars on the UKRO website.

As the IC you should lower the tempo, ensure all generators are off and that tool belts are removed. Those in contact with the patient must be wearing medical gloves, check all the sharps are covered, the patient is uncovered from the casualty sheet and that the oxygen has a clear

This will be balanced with the actual amount of space you can create as with a car on its side up against an immovable structure there is only so much you can achieve and it may mean 'tunnelling out'!

There are key factors which define this, the most important being the patient's injuries and it is vital that you as the IC and all the team are aware of these. The injuries, coupled with the position they are in will generally dictate, as the rule of thumb is to take them out in line wherever possible. This will be balanced with the actual amount of space you can create as with a car on its side up against an immovable structure there is only so much you can achieve and it may mean 'tunnelling out!'

What should be taken into consideration is that the more space you have, the easier it is to manage the board work and if you are able to create enough space to get your crews either side of the board then you should aim to do so! pathway out. At this point hand over to the medic. The medic must confirm all injuries with the team and confirm that everyone is in place and are aware of the pathway out.

To me, this is the final part of the team approach and extremely important and if you have not fully trained on this so everyone is fully aware of their roles, then you can undo all your previous good work.

That is a brief look at the team approach from my perspective and I have used it to great success both on the road and in UKRO/WRO Challenges. It is straightforward but only if you pre plan and train hard, but not only will you benefit from it but so will the public that we all serve!

Paul Maynard is an Area Manager with Royal Berkshire FRS and the current Response Manager. He is still active in the development of all RTC training and equipment within Royal Berkshire. He has been a member of the Royal Berkshire Extrication Team for nearly 20 years and team leader since 2007. He led the team to three successive World Rescue Challenge titles from 2011 - 2013 and is now an Assessor for the United Kingdom Rescue Organisation (UKRO)

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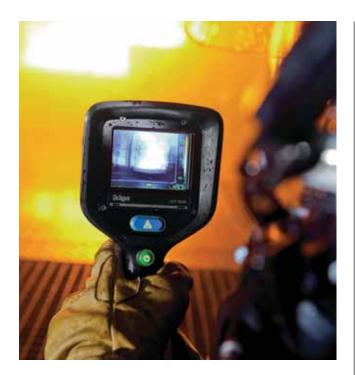
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- Image presentation is unrivalled in the presence of extremely hot fires
- Safer battery technology (lithium-Iron Phosphate) means no risk of dangerous explosion
- The smallest, lightest and most affordable NFPA 1801 compliant thermal imager ever created

It's no surprise that the Mi-TIC has been adopted by many of the Fire Services in the UK and Europe with rapid growth in the US and beyond.

Our priority is to make products that keep firefighters as safe as possible; in fact, it's our mission to help end preventable fire related deaths through the application of thermal imaging technology.

We will continue to work closely with Fire Services in the development of our product range.

Safety through innovation, it's what we do.

For more information, go to www.argusdirect.com/fire.





IT'S WHAT WE DO.

Fifteen years ago we gave Emergency Responders the power in their hands. Today, we continue that tradition with thermal imaging products that are Simple, Ergonomic, and Tough. We put the right tools in the hands of Emergency Responders. It's what we do.

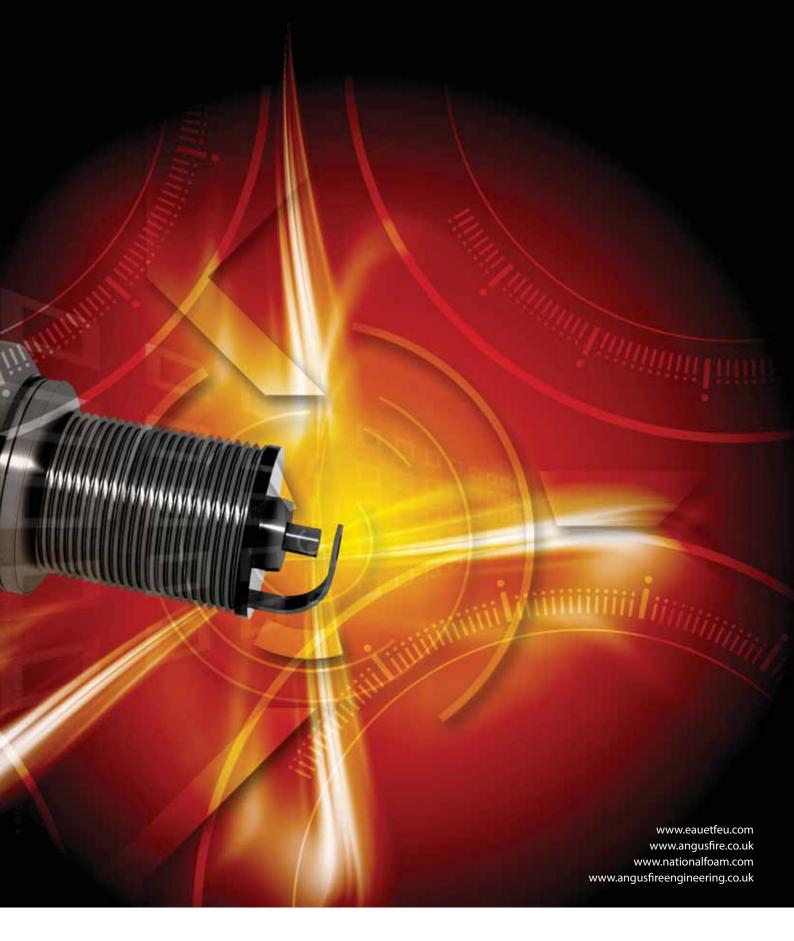
SIMPLE. ERGONOMIC. TOUGH.





There's a new power in global fire fighting. Four major international brands have combined together to offer the most comprehensive range of products and services worldwide. We're fired up to help protect lives, property and assets, and excited about the prospects our new global strength brings to our customers.

UK-based Angus Fire, US-based National Foam and French-based Eau et Feu have a long history of fire fighting innovation and occupy a unique position in the development and manufacture of fire hose, foam concentrates and fire fighting equipment worldwide, whilst Angus Fire Engineering is a leader in the design, build and commissioning of systems worldwide.



Over the past two hundred years, we have achieved many industry 'firsts' and remain at the forefront of environmentally responsible technology through continuous investment in research and development. We supply customers in over one hundred countries. If you are one of them 'thank you'. If not, we look forward to welcoming you into an exciting future together.









THERMAL IMAGING CAMERAS BUYERS GUIDE



FLIR is a brand that has been well-known in the fire fighting sector for many years. Last year, the company re-entered the equipment market with its new FLIR K-Series range based on its proven detector technology; and thanks to economies of scale, the result for fire fighters is a range of thermal imaging cameras that represent exceptional value for money.

Two models complete the FLIR K-Series range. FLIR K40 has a 240 \times 180 pixel array and, for those who require the best image clarity, the FLIR K50 boosts the resolution to 320 \times 240. Both models have a bright 4" LCD display, will withstand a drop of two metres onto a concrete floor and are water resistant to IP67.

Although primarily designed for fire attack, the FLIR K-Series is also eminently suited to use in any search and rescue situation. Up to 200 thermal images can be stored in-camera and later used in a post-incident report. Five imaging options in both models allow the user to shift thermal sensitivity and effective

temperature range modes to help speed up tactical decision and the search for survivors.

'Thermal imaging basic' is ideal for initially sizing up the fire scene and fire attack; 'greyscale' does a similar job for those who prefer an image free from colour; 'fire mode' improves sensitivity in high scene temperatures and 'SAR' optimises the palette to assist in pinpointing the location of a fire victim. And in 'heat detection mode' the hottest spots are highlighted in colour.

In common with all FLIR models, every FLIR K-Series thermal imaging camera carries a two year product warranty that



complements its ten year detector warranty. Users just need to register their camera on the FLIR website in order to benefit from this warranty.

For more information, go to www.flir.com



SISG INFRASYS

ISGs Advanced Thermal Imaging Cameras provide a level of situational awareness unmatched by any other camera on the market, they deliver performance enhancing imaging that allow the user to fully interpret a fire scene and make better, safer, tactical decisions. Our X-Series has been designed to provide a remarkable image. Its unique clarity with high-resolution imagery and full-size LCD are all housed inside this lightweight and compact system.

ISG specialise in the manufacture of one product, for one market. Thermal imaging is our main focus and the needs of the firefighter are all that matter. We have listened to market demands and have taken great effort to minimize the user interaction and simplify the operation of our cameras, for instance, Intelligent Focus is an automatic process, which can only be found in ISG thermal imagers. With Intelligent Focus, firefighters have the ability to focus their camera directly toward an object of interest, and see that object in crystal clear detail, just point the camera directly toward the object and watch your camera do the rest!

Automatic tactical colourisation provides firefighters with a means of recognising different temperature ranges depicted in a scene. This great situational awareness enhancement allows you to immediately identify key scene details of your surrounding environment so you can quickly assess your situation and highlight any high-risk areas.

ISG also provide the only cameras with Hot Spot Tracking, an enhancement used for situations where automatically identifying hot objects is vital to safety and Cold Spot Tracking, an application for cold spot tracking is to help locate gas or chemical valve leaks, but are many more uses for this amazing image enhancement.

ISG manufacture their own cores, especially constructed for firefighting. This offers several unique benefits that are instrumental in providing image quality that is superior to every other thermal imager and it allows us to better contain service and maintenance costs, plus it gives us a unique ability to provide future upgrade ability on all our cameras, future proofing your investment. ISG provide advanced thermal imaging cameras, we are world number one for good reason.

For more information, go to www.isgfire.com

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The Eagle Attack is a tactical lightweight thermal imaging camera. Its high resolution design gives you great image quality and functionality not normally available in lightweight imagers. Developed for onthe-job reliability, durability and ease of use, the Eagle Attack is one of the lightest and most portable imagers in the industry.

TO LEARN MORE VISIT: SCOTTSAFETY.COM

LET'S WORK. TO SEE MORE VISIT: YOUTUBE.COM/SCOTTSAFETYEMEA



THERMAL IMAGING CAMERAS BUYERS GUIDE



MSA introduced one of the first firefighting thermal imaging cameras over a decade ago. In the years following, we've refined TIC design through innovation and expertise, delivering several successful generations of market-leading TICs. We continued this commitment to the fire service by releasing the EVOLUTION 6000 TIC, a new NFPA-compliant platform to make TIC use easier, faster, lighter, and more intuitive.

The EVOLUTION 6000 TIC platform comprises three models to offer the best mix of features, including NFPA 1801 compliance, to support the thermal imaging needs of all first responders.

New and enhanced features include best-in-class image quality with high resolution 320x240 imaging cores, light weight, laser pointer and range finder, compass, integrated video and picture capture and integrated wireless video transmission system to take user experience to another level.

NFPA compliant third-party certification, nonincendive equipment (UL Class 1, Div 2) for additional safety within combustible environments, fireground tough product design provides waterproof shock resis-

tance, and a
Camera Configuration Application
customize camera settings
to meet customer needs.

EVOLUTION® 6000 Basic TIC provides easy to use performance – a simplified fireground tool. Economical, durable value to fit budget. Standard flashlight provides extra visibility for firefighter proximity to enhance safety and situational awareness. Laser pointer pinpoints hot spots and other areas of interest to allow others to take fast, specific action.

EVOLUTION 6000 Plus TIC adds additional tools to aid and improve fireground safety and decision making. 2x/4x zoom gets a closer look at areas of interest. Six user-

selectable colour palettes provide flexibility to view thermal images. A compass allows for faster rescues and improved situational awareness by displaying letters or icon for directional information. Optional integrated video transmitter enables remote monitoring for improved decision making. Optional integrated range finder offers more usable information to enable faster, more precise action from 5 to 70 metres away (replaces flashlight option).

EVOLUTION 6000 Xtreme TIC adds integrated picture and video capture to save action to camera's internal hard drive. It offers the capability to download pictures and video to your desktop and use pictures and video for training, after-action review and documentation.

EVOLUTION 6000 TICs are tools for firefighters and first response emergency personnel that are used for search and rescue, fire scene size-up, overhaul, location of victims, and advanced firefighting and first response applications. The design is optimised for firefighters in ergonomic design, ease of incorporation with firefighting gear and to withstand rigors of firefighting environments.

For more information, go to www.msasafety.com



Since the introduction of thermal imaging technology to the fire services, Scott Safety has been at the forefront of innovation providing advanced, fire-ground proven thermal cameras to first responders for use in search and rescue, overhaul operations and hot spot identification.

Thermal imaging camera (TIC) technology has dramatically progressed since the first prototypes in 1992. Initially expensive, bulky, weighty and temperamental pieces of equipment, thermal imaging cameras have evolved into essential tools that are small, lightweight and affordable. Originally developed by the military for use in combat, they were expensive, with limited application in civilian situations. However, technological advancements have meant that thermal imaging cameras now serve many other useful purposes and the fire service is no exception.

As one of the leading experts and innovators in thermal imaging technology, Scott Safety has developed the Eagle Attack Thermal Imaging Camera which sets a strong benchmark for its quality, performance, design and cost. With close relationships to a number of fire services worldwide, Scott Safety spoke to hundreds of firefighters for their input in the design and development of the Eagle Attack. Firefighters wanted a full-featured imager in a compact form, without having to sacrifice quality. As a result the Eagle Attack has been designed with a high resolution and anti-glare display, proving users with great image quality and functionality not normally available in lightweight imagers.

Tony Pickett, Global Product Manager at Scott Safety, said: "Quality and performance cannot be compromised when it comes to providing equipment for the emergency services. With this in mind, we have made sure that our thermal imaging cameras are developed to meet the highest specifications. Scott Safety understands that TICs are vital to allowing the fire and rescue services to quickly and safely respond to emergency situations, making the necessity of a functional, reliable and

Accert Second

up to date product paramount. The Eagle Attack thermal imaging camera fulfils these requirements and delivers the performance, quality and durability that modern day fire fighters demand."

Weighing only 765 grams, the Eagle Attack is one of the lightest and most portable cameras in the industry. Designed for ease of use, single button operation enables the device to be switched on within two seconds while its ergonomically designed handle is comfortable to hold. The low unit cost of the Eagle Attack also means that fire and rescue services can purchase at least one camera for each fire appliance which will undoubtedly improve efforts in search and rescue attempts.

As customers have come to expect from Scott Safety, the Eagle Attack can also be custom configured to suit their changing needs. It comes with greyscale or color imagery, in addition to an optional thermal video recorder (TVR) which automatically captures every event for training and documentation purposes. It also comes in three rubber bumper colours to suit branding requirements. Above all, quality is not sacrificed for portability or cost.

For more information, go to www.scottsafety.com





Extremely affordable FLIR K50 cameras help you attack fires more strategically and find victims faster. Get the bright big picture and tactical advantage you need to see under the most challenging conditions.

Buy a K50 now through September 30th and we'll give you an Extech C010 to help alert you to dangerous carbon monoxide levels.

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Dave Pelton

Firefighting Foam Advancements ... Then & Now

Chemical 1915-1933

Protein 1933 Synthetics 1963 Fluoroproteins 1965 Environment Safe Foams 2005

t is often said that in order to shape the future you need to look back and understand the past. A colleague of mine recently asked: "when and what was the last great innovation in firefighting foam?" I have to admit, I had to think about the question and before I could answer he stated: "Aqueous Film Forming Foam (AFFF) in the early 1960s, at a time when vacuum tubes and black-and-white television were considered advanced technology and John F. Kennedy was the U.S. President." This time period is considered the last significant innovation in firefighting foam – nearly some fifty years ago. So it got me thinking about the advancements in firefighting foam and where does the future of firefighting foams lie.

The first question, of course is: what is firefighting foam?

The National Fire Protection Association (NFPA) 11 – Standard for Low, Medium and High Expansion Foam defines firefighting foam as: "... an aggregate of air-filled bubbles formed from aqueous solutions which is lower in density than flammable liquids. It is used principally to form a cohesive floating blanket on flammable and combustible liquids, and prevents or extinguishes fire by excluding air and cooling the fuel. It also prevents reignition by suppressing formation of flammable vapours. It has the property of adhering to surfaces, which provides a degree of exposure protection from adjacent fires."

Or simpler said . . . foam is used for the suppression of fire. Foam extinguishes flammable liquid or combustible liquid fires in four different ways:

- Separates the flames from the fuel surface.
- Retards vapor release from the fuel surface.
- Cools the fuel surface and any surrounding metal surfaces.
- Excludes oxygen from the flammable vapours.

How is Foam Made?

Finished foam is a combination of a foam concentrate, water, and air. When these three components are brought together in the proper proportions and mixed, foam is produced. The figure opposite shows how the final foam is made through a typical proportioning device.

Characteristics of Foam

To be effective, good foam must contain the correct blend of physical characteristics:

 Knockdown Speed and Flow: This refers to the time required for the foam blanket to spread across a fuel surface or around obstacles

- in order to achieve complete extinguishment.
- Heat Resistance: Foam must be able to resist the effects of heat from any remaining fire from the liquid's flammable vapour or heated objects.
- Fuel Resistance: Effective foam minimises fuel pick-up so that the foam does not become saturated and burn.
- Vapour Suppression: A vapour-tight blanket must be capable of suppressing the flammable vapours and minimise the rise of reigniting.
- Alcohol Resistance: Foam blankets are more than 90 percent water. Because of this, foam blankets that are not alcohol resistant will not last very long.

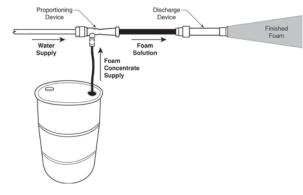
Foam Classifications & Types

Each type of firefighting foam has its applications. Use applications range from wild-land and structural firefighting to industrial high-hazard, high-risk applications found in aviation, chemical, defense, energy, marine, mining, oil and gas, petrochemical, pharmaceutical, pipeline and solvents and coatings industries. Firefighting foams are divided into two classifications Class A and Class B.

Class "A" Foam

Developed in the mid-1980s, Class A foam was predominately used for wild-land fires but as its popularity grew throughout the 1990s the use of Class A foam was expanded for use on structural fires.

Class A fires consist of ordinary combustible materials, such as paper, cloth, wood, and plastics. These type fuels require the heat-absorbing effects of water (cooling) or water solutions. Class A fires consist of two types: flaming combustion involving



FOAMS

Technicians conduct a foam burn-back test



gases that result from the thermal decomposition of the fuel. The second type is deep-seated or glowing. This type represents combustion within the mass of the fuel and has a slow rate of heat loss and a slow rate of reaction between oxygen and fuel.

As a synthetic based foam concentrate, Class A foam is applied at low concentrations ranging from 0.1% to 1.0% (see application rates below). Cooling and wetting are the primary extinguishing mechanisms. The use of Class A foam makes "water wetter" on average increasing the effectiveness of water tenfold.

Mop-up: 0.25% **Initial Suppression:** 0.5% **Fire Brake:** 0.75% **Protection:** 1.0%

Note: the minimum admixture rate on other Class A fuel types are 0.1%.

These application rates make the use of Class A foam a cost effective means of combating fires because smaller amounts of foam concentrate can be used to make effective foam. Class A foam is biodegradable and non-toxic, so it is environmentally sustainable. Class A foam is deployed through a variety of portable and fixed appliance devices ranging from firefighters' backpacks, brush and fire apparatus, to rotary and fixed wing aircraft.

As we look to the future, the use of and application for Class A foam will certainly advance technologically. A current example to point to is the recent generations of nozzle-aspirated induction systems and compress air foam systems (CAFS) have been more reliable than earlier generation models.

Class "B" Foam

There are several types of available foams. Each foam concentrate is developed for a specific application. Some firefighting foams are thick and form a heavy, heat-resistant covering over a burning liquid surface. Other types of foams are thinner and because of that, they will spread much more quickly over the fuel surface. Still, other types of foams will generate a vapour sealing film on the surface of the fuel. Additional foam concentrate types, such as medium and high expansion foams, can be used in applications requiring large volumes to flood surfaces and fill cavities within the hazard.

Chemical Foams

These foams are produced by the chemical reaction that occurs when the two chemicals,

aluminium sulphate and sodium bicarbonate and mixed together. The energy required to create the foam bubbles comes from this reaction between the two chemicals. This type of foam is obsolete.

Protein Foams

Protein foams are manufactured with naturally-occurring sources of protein, such as hoof and horn meal or feather meal. They are intended for use on hydrocarbon fuels only. Foam made from protein foam concentrates usually have good heat stability and resist burn-back. They must be properly aspirated and should not be used with non-air aspirating fog nozzles. These foams are generally not as mobile or fluid on the fuel surface as other types of low expansion foams. Protein foams are susceptible to fuel pick-up, therefore, care should be taken to minimise the foam and fuel from submerging.

Synthetic Foams

This type of foam concentrate is based on a mixture of surfactants and solvents, both fluorinated and fluorosurfactant/fluoropolymer-free. These types of foam concentrates may or may not form films or membranes on the fuel surface, depending on the foam concentrate and the fuel being protected.

Fluoroprotein Foams

Fluoroprotein foams are a derivative of protein foams. Fluoroprotein foams have fluorochemical surfactants added. They are intended for use on hydrocarbon fuels and selected oxygenated fuels. They must be properly aspirated and should not be used with non-air aspirating fog nozzles.

Why Use Foam?

Class B fires consist of flammable or combustible gases, and liquids. Extinguishment is normally accomplished by excluding (eliminating) oxygen, interrupting the combustion of the chain reaction, or stopping the release of the combustible vapours. The type of Class B hazards are either water soluble (meaning they mix with water) [for example, polar solvents] or water insoluble (meaning they will not mix with water) [for example, hydrocarbons]. For water-soluble fuels, special alcohol resistant foam agents that will not mix with the fuel are required.

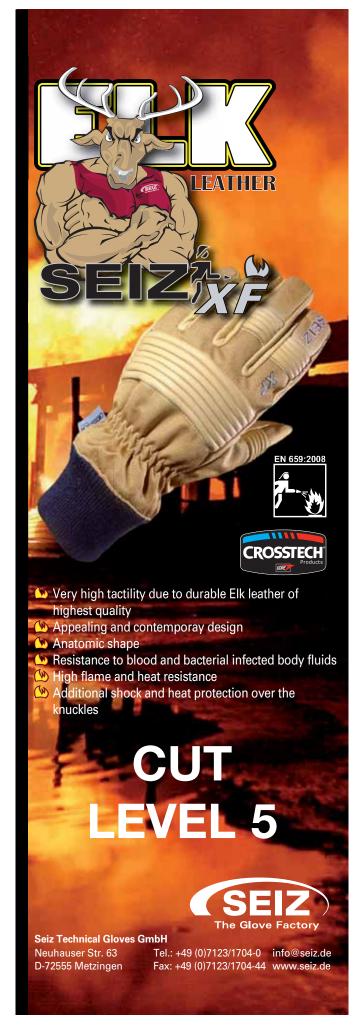
Many different extinguishing agents are effec-







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tive on flammable or combustible liquids. However, foam is the only extinguishing agent capable of suppressing vapours and providing visible proof of securement. Reasons to use firefighting foam include:

- Fire Prevention: Application of a foam blanket on an unignited spill.
- Vapour Suppression: Prevention of vapours from finding an ignition source.
- Odour Control: Suppression of hazardous or noxious vapours.
- Personnel Exposure: Protection of fire and/or rescue personnel during emergency operations.
- Asset Protection: Pre- and post-security of the hazard until securement or removal is conducted

Class B foam is not effective on all types of fires. It is critical to know the type of fire and fuel involved. Firefighting foam is not effective on: Class C Fires (energised electrical equipment) as water conducts electricity and foam contains 90 percent-plus water. Class C fires can be extinguished by either de-energising the equipment or using alternative extinguishing media such as dry chemical, carbon dioxide or a clean agent; pressurised gases - materials stored as liquids but are vaporous at ambient temperature. The vapour pressure for these type fuels is too high for foam to be effective; three-dimensional fires – in which the flammable liquid is being discharged from an elevated source creating a pool fire on a lower surface area; Class D fires - combustible metals such as aluminium, magnesium, potassium, sodium and titanium alloys. The extinguishment of Class D metals requires the use of specialised dry powder agents.

Evolution of Class B Firefighting Foams

Firefighting foams have been on the market for almost 100 years in various types. Firefighting foams started with chemical foams, at each of these steps along the way, performance and safety of these various agents improved on the prior foam agent types/concentration.

Early 1900s: The first firefighting foams were chemical foams. They functioned by a chemical reaction from mixing two or more chemicals at the time of use, which created the foaming. More effective than water, but difficult to use and transport. Also, there was always the risk of improper mixing at the time of use.

1930s: Protein foams were a major improvement. They were chemically stable and effective on Class B fires. At that time, they quickly became the industry standard. Their major drawback was limited shelf life and limited storage temperatures, issues that are still problems for protein-based products today. Also, protein foams work best when they are discharged through air aspirating equipment that creates a thick foam blanket, but depending on the type of foam discharge equipment, can negatively affect the discharge range compared to non-aspirated equipment.

1960s: Synthetics (AFFF and AR-AFFF) entered the market. They have the ability to readily spread over a fuel surface, are very forgiving during a fire, they can be discharged through all types of nozzles, and have an extended shelf life. Fluorinated synthetic

foams are the mainstay of the foam fire protection industry, and have only recently been under review, not for their firefighting performance, but due to their environmental impact. Current synthetics are capable of extinguishing hydrocarbon and water soluble fuels, and can be discharged through air aspirating and non-aspirating nozzles, allowing maximum flexibility during use.

Mid-1960s: Fluorprotein foam was introduced after the synthetics, mainly as a market response by the protein foam manufacturers. Adding fluorosurfactant to standard protein foams allowed the protein foams to more readily spread on the fuel surface. This step improved the performance of the protein based foams to somewhere between protein only foam and the fluorinated synthetics.

2005/Present: As environmental regulations on fluorinated synthetic foam concentrates increase around the world, a new generation of environment friendly foam concentrates is being developed. These concentrates are environmentally sustainable fluorosurfactant and fluoropolymerfree firefighting foam used to effectively extinguish Class B fuels with no environmental or toxic breakdown. They are synthetic based foam technology designed to replace traditional AFFF and AR-AFFF foam concentrates and older fluoroprotein foams.

Summary

As I mentioned at the start of this article, firefighting foams have been used for the extinguishment of fire for almost 100 years in various types. Firefighting foams started with chemical foams, and at each of the advancement steps along the way, performance and safety of those agents improved on the prior foam concentrate type. Despite the importance and need for firefighting foam today, the last significant development efforts occurred in the 1960s with the commercialisation of AFFF for Class B foams, and the 1980s for Class A foam, now some fifty and twenty years ago respectively. So what will the future hold?

Surely the developments in induction systems for Class A foam (and perhaps the agent chemistry) will continue to advance as it has over the past decade. But as for Class B foam concentrates. agent chemistry development efforts seem to have been frozen in time with reliance on exiting base technologies. Only since the introduction of environmental regulations over the past five years or so on fluorine containing AFFF's have the manufacturers of firefighting foam taken the development challenge seriously. These fluorine-free products (some first generation and others second or third generation) will continue to evolve in both agent chemistry and firefighting performance with the goal of achieving high performance on flammable and combustible liquids, improved burn-back resistance for firefighter safety and provide for many additional years of shelf life over foams derived from protein.

Dave Pelton is Vice President, Global Marketing for The Solberg Company

For further information, go to www.solbergfoam.com





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A.K. Rosenhan, PE, CEng., CFO, FIFireE

Let's face it, the basic response to any emergency, albeit fire, emergency medical service (EMS) or rescue is simply the firefighter. Certainly the hardware necessary to meet a challenge, whether it is motorised apparatus, pumps, powered equipment or simply hand tools, is useless without the firefighter. Personnel are the real assets for any emergency operation.

etting sufficient amounts of person power to a scene is always a problem. No matter if these persons are full time career, part time, or volunteers, they must be ready, willing and able to do a job and, hopefully, be equipped to accomplish that job regardless of the circumstances. After all, fire is fire and gravity is gravity, in the big city or in the country. The challenges may vary in magnitude and frequency but they are pretty much the same for every Fire Department (FD). The Laws of Physics are pretty consistent and must be prepared for and handled.

The old adage that 'fires are not put out with water, but with dollars' is alarmingly true. It costs to equip, maintain and operate any emergency service. In a career department it is not unusual for 90% of the budget to be applied to personnel. Once you have taken the cost of fire apparatus and the equipment into account that leaves little to provide the tools and operational expenses necessary to deliver adequate services.

In many areas of the United States it's simply too cost prohibitive to support a career department. The funding, the population density and government resources simply aren't adequate to provide a full time FD which is why the volunteer fire service is the predominate type of FD in the USA.

Whether they be called volunteers, paid-on-call, part-timers, retained or simply responders, they are pretty much the same, but they are all dedicated to serving their communities and spend countless hours training, preparing and responding. They may be strictly firefighting but may also do rescue, EMS, disaster response or any number of other efforts. The old saying "if there is any kind of

problem, call the Fire Department" is well used.

In America the Volunteer Fire Service comprises some 89% of firefighters operating out of an estimated 48,800 stations. Most of these, some 70%, have one station, 16% have two and 14% have three or more. It is estimated there are over 1.25 million fire department members throughout the USA. The first FD in America were volunteer, founded by such notables as George Washington (the first President of the US) and Benjamin Franklin back in the late 1700's. The first paid or career fire department didn't come about till the 1840's and even then only a few of the large cities had them. And it's an interesting mix even today as several fairly large cities with some high population densities have volunteer departments, maybe with career drivers for daytime response when volunteers may be at their regular jobs. Conversely some rather small towns have full time, career departments

Today the funding for these volunteer departments is as varied as the departments themselves. Some are entirely tax supported, others entirely self supported through fund raisers and donations, with others literally selling memberships — as did the very first volunteer departments. And there are numerous grant or award programs, some from the Federal Government (such as the AFG Assistance to Firefighter Grants) and others from private companies. The competition for such funds gets rather hectic at times, but every little bit helps.

An even bigger problem is getting people to volunteer their services. With so many demands on families and individuals from various groups and personal responsibilities it is always a problem to

called volunteers

persuade people to find the time to train, respond to calls and to be generally active in a FD. The relatively low population density in the areas served by the FD limits the pool of available persons willing and able to participate. But, regardless of one's age, abilities, interests, backgrounds and such there is always something to be done. Not everyone is a 'firefighter' but would have various jobs and activities to accomplish at an emergency scene. With increasing demands from various agencies regarding training levels, certification, legal standards, and ultimately FD requirements there is a limit to the resource a person can and will devote to a FD. While all training is good and a well-trained person is desired, the physical, available time, and capabilities must be tempered with safety and competent service.

As previously discussed, the resources available to the smaller volunteer departments are limited which exacerbates the devotion, personal contributions (time, money, effort) to make a FD function.

But the overriding consideration is service to the community and the citizens served. In a smaller community there is a high probability that anyone calling for emergency services is a neighbour, a friend, or even kinfolks. Hence the emotional aspect of responding is great and can be personally upsetting in a serious situation. There is also sometimes the problem of a responding Firefighter having a personal problem or conflict with persons requesting service. Such needs to be monitored and controlled so that no problems are generated.

The need for good leadership, while always important in an Emergency Services organization is even more so in a volunteer organization. In a career Department it may be said that management has the ability to "push" members . . . employees . . . to get things done and to operate. But in a volunteer organization the ability of management to push is really turned into a "pull" type style. A leader must always be in front, but a volunteer leader must cope with all the typical problems of management but without one employee impetus, that of a pay check. And it is much more likely a career organization will have an employee Union or organization to deal with, whereas a volunteer organization is more on a personal basis. While there are interpersonal politics in any group, the volunteer organization is usually quiet in this regard. The concept of "neighbours helping neighbours" hopefully precludes empire building

And the Volunteer Firefighter is so many times 'on their own' in that backup personnel, equipment, medical help, and other urgently needed resources are simply not available. Even if additional resources are coming, very often they have a long way to come and may not really have the resources needed nor be familiar with the area and environment. A strong, unified incident commander must be present and be capable of making decisions on the spot. Freelancing of equipment and personnel must be discouraged and controlled.

It must be recognised the same hazards, dangers, challenges and needs occur in the smaller towns and rural areas as they do in the bigger cities. The ultimate size of the problem and the frequency of occurrence may be smaller, but the spectre of disaster is always present. Mother Nature



will do a number on the department and personnel regardless of the size of the FD or whether it is a career or volunteer organisation. Competent and active leadership must be in effect at all times to ensure safety and effectiveness of operations.

Recently a series of tornadoes raced across Mississippi and while several hit larger populated areas, equipped with career departments and significant local resources, other smaller areas were hit particularly hard. One town of about 6,500 population was especially devastated with 10 deaths, several missing, 295 homes destroyed, 168 having major damage, 82 more with minor damage, 102 with some damage and so far uncounted total monetary damages, the local hospital destroyed, and several manufacturing facilities completely destroyed. The local FD, while a combination career/volunteer department with only two firefighters on shift, was overwhelmed, although all their apparatus and station was spared damage. There were no real additional resources in 30 mile radius, although upon learning of the severity of the tornado damage and scope of injuries every volunteer department and city road and utility crews for miles around responded with manpower, chainsaws, rescue gear, floodlights, tools, and anything that could possibly be used for rescue and help. It turns out that this was an EF4 tornado and the most powerful one to hit the USA for some time. The magnitude of this situation was simply staggering. Certainly various government agencies, complete with the National Guard, responded but it took hours to get on scene. Ultimately there was plethora of agencies and groups, a veritable smorgasbord of acronyms' and resources, all converging and somewhat setting the local VFD into the background.

All of this response was voluntary and without direct cost to the affected municipality and area. It was simply 'neighbours helping neighbours' which is typical of the philosophy of volunteer FD – all done in the spirit of serving neighbours and communities. Funding for these operations, reimbursement for some respondents, and financial help for those affected was forthcoming, but the immediate situation put a strain on local resources.

From the philosophy and actions of the Founding Fathers in America, the Volunteer Departments have grown and prospered to be the backbone of the American Fire Service. No doubt, the same philosophy is prevalent throughout the world in various guises, types of organisations and abilities. The need for service is obvious, with Volunteers stepping into the breach to provide for their neighbours.

A. K. Rosenhan is the Fire Services Coordinator for Oktibbeha County, Mississippi, USA. He is a Fellow in the Institution of Fire Engineers, a Chartered Engineer in the UK, and soes consulting work in fire appliance design, accident and failure analysis.

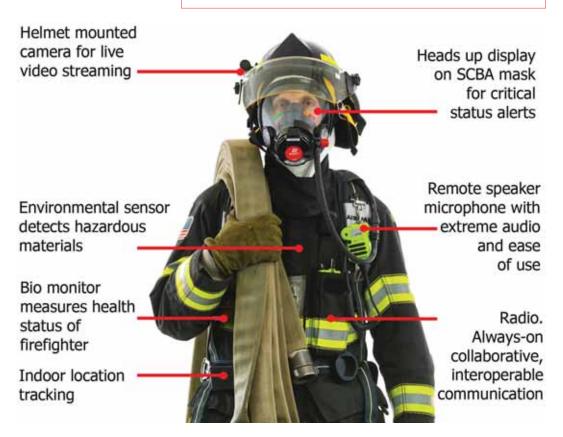


During the damping-down operations two users of breathing protection from the Imst Town Fire Brigade were in action, each secured with an MSA AirGo self-contained breathing apparatus with an integrated alphaFP fall protection harness. The alphaFP harness prevented Manuel Wieser from a dangerous fall from a height of 6 metres and saved his life.

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THE CONNECTED FIREFIGHTER



The application of fireground intelligence

Firefighters need fast, reliable communications with clear audio, better safety systems and situational awareness to help them plan their response and be ready for the unexpected. This article examines current capabilities and looks forward to the collaborative technologies which will let commanders remotely monitor the status of firefighters, improving awareness and safety.



Steven Young

Improving incident command decisionmaking and firefighter safety

gainst the chaotic backdrop of a raging fire and the increasing complexity of multiagency response, Incident Commanders can rapidly be inundated with information. Distractions and critical tasks impact their decision-making. When keeping track of firefighters, Incident Commanders need to know who is fighting the fire, where, what they are doing, for how long and how they are.

This is the main reason why 'accountability' systems have become one of the most important safety measures on the fireground today and is a key driver for the development of the connected firefighter. Historically, incident command have created manual systems to keep track of personnel – from ID tags placed in a bucket, to white boarding to tell if a firefighter was in or outside the fire.

Two-way radios have been a firefighter's mission-critical lifeline and as a result, have drastically transformed the way firefighters do their job. Better radio and equipment coupled with wireless technology breakthroughs mean safer and smarter communications leading to better accountability. Radios and assured access to voice communications mean information can be relayed more quickly, enabling firefighters to report their status directly to incident command via push-to-talk (PTT) capabilities.

Today's accountability solutions integrate better tools, Personnel Accountability Reports (PAR), timers that indicate when a fire crew arrives on scene and evacuation notifications. The aim is for Incident Commanders 'to see everything' on the fireground and pinpoint each firefighter on-scene. Through the use of the latest solutions Incident Commanders could manage and transmit real-time information

THE CONNECTED FIREFIGHTER



(identification, emergency alerts, radio battery life, voice responses and reports) for all personnel and resources to and from a single user interface.

Working against the clock

Consider the time it takes to account for all personnel on-scene at the fireground. 30 minutes is a not unfair estimate. In a heightened emergency environment this is far too long, when the Incident Commander needs to be focussing on coordinating the response and the safe evacuation of people from a building.

Simple commands such as 'call out' alerts and 'mayday' assistance requests would be automated to significantly reduce cycle time on Personnel Accountability Report (PAR) checks. So when a call out alert is given, every firefighter will hear a tone request and press the push-to-talk (PTT) button on their radio to acknowledge. The Incident Commander receives a confirmation of who has acknowledged the roll call and who has not. If a firefighter does not acknowledge the Commander will immediately see who did not respond and can take necessary steps. These types of capabilities, provisioned on simple, easy-to-use tools help incident commanders improve their effectiveness.

This simple example demonstrates the value to first responders of always-on voice and data communications over dedicated networks. Streamlining accountability through new applications is the first important step towards the future connected firefighter.

Connecting the firefighter

The connected firefighter represents a collaboration of varied, connected and ultimately integrated technologies which communicate directly with the firefighter and the Incident Commander. As a result, the connected firefighter demands a robust, reliable and secure communications network be in place. One that supports standards-based mission critical integrated voice and data communications for emergency response and coordinated communications during and after an incident. Increasingly the network, or a combination of networks, must be optimised to deliver integrated voice and data. Secure, guaranteed, send and receive voice and data communications needs to be deliverable across a wide area.

At the hub of the connected firefighter's collaborative technology is a ruggedised radio designed for first responders working in extreme environments. The demands on this device are clear; it needs to be simple to operate. The radio needs to be ergonomically designed for the working firefighter

with enlarged, glove-friendly controls which can be easily located and operated without necessarily being able to see the device.

A clear, easy to access interface for both voice and data is paramount. Despite the connected fire-fighter being increasingly data centric, the significance of voice must not be ignored. It remains the primary interface for the firefighter at scene, so the radio must deliver clear audio ensuring every word and audio alert is heard. To this end, noise suppression technology can effectively reduce most extraneous noise – pumps, fire roar and sirens – ensuring firefighters can hear and be heard in the loudest environments.

For the connected firefighter enhanced safety functionality is built in, with Automatic Accountability Check-ins (AAC) and man-down integration, automatically sending out a distress signal if firefighter is prone and motionless. This is technology readily available today, but as we look forward, the radio's collaboration with a range of networked devices, either worn by the firefighter or operating independently, will begin to deliver increasingly accurate, mission critical information to the firefighter and the Incident Commander.

Enhanced situational awareness

The firefighter's helmet and self contained breathing apparatus (SCBA) mask are core platforms for advancing situational awareness for the connected firefighter.

We are already seeing first concepts for SCBA mask integration, with heads up display (HUD) capability giving firefighters real time status updates. This is enabled through the provision of LED alerts – such as monitoring existing levels within an airtank. Today, Motorola Solutions is working on advanced monitoring with a number of air tank providers, relaying air levels via radio link to incident command. The company can also relay and display information including current channel, talk groups and battery levels from its integrated radios to the HUD.

Body worn video is a technology actively being trialled by first responders. Whether mounted on the user's chest (more stable), or helmet (improved point of view (POV)), the advantages of live streaming video from the fireground for enhanced situational awareness is unequivocal. With the Incident Commander gaining access to real-time views of a hazardous situation from multiple feeds decision making is greatly enhanced. In addition, the deployment of personal cameras capable of providing infrared or thermal imaging means video capture in dense smoke becomes possible. The advantage of directly communicating these images to incident command will dramatically enhance situational awareness.

The HUD on the SCBA mask will also receive enhanced environmental and biometric monitoring which will form a crucial part of the individual fire-fighter's safety system. Environmental sensors which can quickly identify threats at an incident scene are a near term development. They will help to position firefighters and accelerate the rescue of public from areas which pose immediate hazard to health. These arrays of sensors will both register and immediately communicate the presence of toxins, gasses, environmental temperature and even radiation. In addition to enhanced situational awareness this information will allow Commanders to generate real time environmental incident mapping.

If environmental monitors are then used in conjunction with biometric health monitoring Commanders have the option of proactively remov-

THE CONNECTED FIREFIGHTER

ing firefighters from the incident before a health crisis arises. A boom in the desire for connected health monitoring amongst consumers has helped deliver rapid advances in compact, wearable, high quality physiological monitoring modules. These devices enable the capture and transmission of comprehensive data on the wearer via connected data networks. A prime example would be the Zephyr Bio-Monitoring Sensor, a compact remote monitoring solution. Able to communicate via radio, it provides live monitoring of heart rate and blood pressure, as well as location based information such as speed. All of this data can then potentially be interpreted and fed to the HUD within the firefighter's breathing apparatus as visual alerts, providing easy to digest critical environmental and health information to enhance reaction time. Working in combination with the man-down alerts on the radio, and live video from a helmet camera, the incident commander gains an increasingly clear picture of an individual firefighter and is therefore better able to address accountability in the fireground.

Keeping watch

Understanding the condition of a firefighter is valueless if a Commander cannot accurately locate, in real time, their position. To meet this need Motorola Solutions has integrated with Astro P25 portable radios in the USA the TRX NEON Indoor Location System. Using an advanced sensor package which fuses gyroscope, accelerometer, pressure, compass, GPS, Wi-Fi, ranging sensor information, inferred map and building data, TRX deploys time and mapping algorithms to deliver precise, real-time locations of firefighters when in a building, even if reliable GPS location is denied.

Tracking multiple responders on overlaid building blueprints, the system not only supplies 'eyes' on the inside, it importantly provides a three dimensional element to location so that incident command can see which floor firefighters are occupying. This is especially important in a man down situation, where it is critical to understand if the party is lying on an upper floor or trapped close to the ceiling of the floor below.

The system will also map all steps taken, making it easier for a rescue party to follow and recover a comrade. By combining rapidly deployable multisensor anchor nodes and floor plan information with live video feed from helmet cameras Incident Commanders gain additional valuable and actionable intelligence.

Looking beyond wearable technology, enhanced situational awareness through real-time video streaming can also be gained by embedding video cameras into fire appliances, transmitting imagery over TETRA Enhanced for Data (TEDS) for broad situational awareness. This can also be taken a step further: By unifying TEDS and LTE technologies, firefighters are provided with joined mission-critical voice features and multimedia services to enable multimedia talk groups or collaboration tools as well as unified operations and management. LTE is the world's most advanced wireless broadband technology with a rich ecosystem of technology suppliers and the promise of scale economies. These next generation mission-critical communication platforms help operators and users to augment existing voice and data services with cutting edge technologies and applications that transform response to incidents, improving efficiency and enhancing safety.

For true oversight of the fireground, many are contemplating the application of unmanned aerial



vehicles (UAVs) or drones, which could offer a multi-lens infrared, thermal or regular view of hazards not visible from the ground, such as a roof in danger of collapse. Though successfully deployed for wildfire monitoring in Western Australia and Washington state in the USA, drone technology requires considerable development before it can be safely deployed in urban airspaces. Battery life versus weight (which is defined by the complexity of the flight package of cameras and radio link) means most small drones still have a limited operational lifespan which impacts on their usability. They are also fragile which can impede low level deployment over a fireground. One option would be to deploy a mid-to-high level tethered aerostat a balloon with a camera package deployed from a 4x4 vehicle to provide an 'eye in the sky' live feed which could be shared to incident command.

The intelligent firefighter

While the opportunities to enhance a connected firefighter's situational awareness and safety are considerable, it is worthwhile observing the potential barrage of information that could also be delivered to a firefighter.

Although rich data can be an attractive addition to a firefighter's toolset, the most valuable element for the connected firefighter will still be audio. In an emergency, you do not want to be reading, you want to be calling instruction and receiving advice. Tonal alerts keyed to environmental, equipment and biometric sensors will become common. Hands free communications, with voice activated control of the radio enabling switching of channels, activation of man down, call up location, or switching to an alternate camera POV will be the most powerful interface for the connected firefighter.

The Incident Command's role must be the filter – ingesting a mass of voice, text, telematics and video, and then deploying real-time intelligence techniques currently being developed for police forces to deliver actionable intelligence. For the connected firefighter much of the accountability will be automatically initiated, and monitoring will be managed remotely.

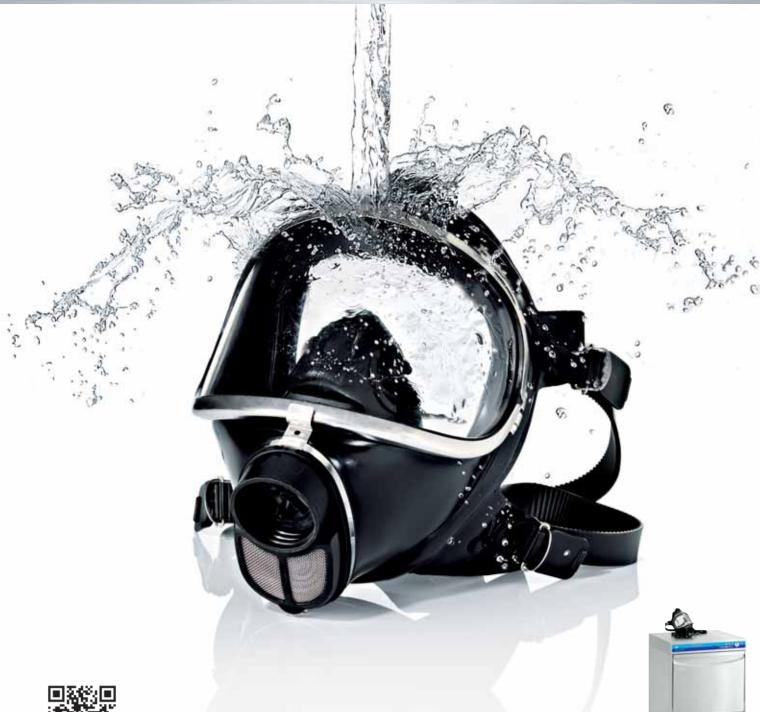
The ultimate aim of the connected firefighter is to deliver critical intelligence applicable to their situation, enabling them to focus on the task rather than the technology. In this manner their capability is enhanced, while complexity is reduced, ensuring all firefighters can engage a fire more safely and with greater confidence.

Steven Young is Vice President and General Manager for TETRA Products and Solutions at Motorola Solutions. He is a communications professional specialising in complex systems and devices serving global mission critical markets.

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HAZARDOUS MATERIALS



The fine line of amateur pyrotechnics



Chris Case

The Fire and Rescue Service worldwide is well versed in the need for operational intelligence. Tragedies are all too common were firefighters and other emergency responders have lost their lives as they fought fires not knowing the significant risks that were present at the time. Countless public enquiries, coroner's inquests and other investigations have reinforced the message that any emergency responder should have the most accurate and up to date information available on which to make command decisions and deal with any crisis.

have had the pleasure to speak to a number of Branches across the UK on the matter of 'Fire-fighter Safety in Buildings' supporting colleagues from East Sussex who deliver an honest and thought provoking presentation on the events of Marlie Farm in 2006 where two members of the Service were killed in an explosion in a fireworks store. The lack of clear information was a fundamental factor in the challenges the service faced that day.

Fireworks fascinate most people and have the ability to generate great passions be them negative or positive regarding this age old craft of lighting up the night sky. The use of light and noise to amaze and entertain has existed for thousands of years, indeed the Chinese used sticks of green bamboo thrown onto campfires to explode and

ward off evil spirits, the account of Marco Polo of Cathay in 1295 talks of such items "burn with such a dreadful noise that it can be heard ten miles at night" and "anyone who was not used to it could easily go into a swoon or even die"

The creation of gunpowder using the ingredients of Wood Charcoal, Sulphur and Saltpetre, processed in defined proportions not only spelled the origins of modern warfare with firearms, bombs and rockets but also the ability to use such explosive materials for harmless entertainment.

There are a large number of people who take pleasure in the manufacture of explosive materials and devices for entertainment, some operate in isolation, others share their thoughts and experiences through established Societies and Associations around the world. In the United Kingdom

HAZARDOUS MATERIALS



the UK Pyrotechnics Society has a growing membership and lively chat room focussed on this subject.

But what is defining line between such uses? When is a firework a weapon? How do we manage those who take great pride and skill in the careful manufacture of pyrotechnics and fireworks to record and share the results with others in a large worldwide community? Can such a hobby be justified in the new world we all live in or would the abolishment of amateur pyrotechnics be a victory for the criminal and terrorists?

Any trawl through the video sharing websites will reveal the results of what would be classed legitimate and illegal use of fireworks both commercial and homemade. The internet not only provides the opportunity to share the results, but also the motivation and methodology to create explosive effects and in a lot of countries it provides a route to purchase the component chemicals and materials.

Since the start of the fireworks crime team in Merseyside in 2004, we have dealt with over 500 incidents of illegal sale, use and manufacture of fireworks. These incidents have ranged from the 'traditional' fireworks through letterboxes to the use of large fireworks to create very effective car bombs. The multi-agency team have had high levels of success in reducing such criminal activities and protecting our local communities, with a range of responses from advice provided at the scene to a full scale joint investigation, the team has many tools and assets to tackle the problem. Seizing hundreds of tons of illegal fireworks and dealing with the offenders has seen such incident reduced by over 80% in the past ten years.

The levels of training and awareness provided to Police and Fire Officers over the same period has dramatically increased, the team maintains a broad understanding of the trends emerging on the internet and regularly recreate explosive devices to examine the technology and provide guidance to investigating officers responding to serious incidents were fireworks have been used for criminal means.

However, the most technically difficult and perplexing incidents involve the amateur pyrotech-

nician, the person who makes explosive effects as a hobby and is only separated from criminality and perhaps terrorist activity by a single word – 'intent'.

Throughout my career in dealing with pyrotechnic related incidents, the amateur fireworks makers have presented the most taxing of incidents. Be it through direct operations or advice being sought over the phone by a concerned colleague challenges such as the incident, risks to the community and complexities of legislation can be a difficult balancing act to manage.

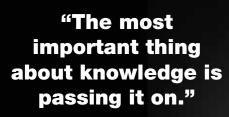
I cannot think of many other circumstances when a legitimate activity in a domestic property presents such unknown dangers to first responders. The criminal manufacture of illicit drugs or the cultivation of cannabis have their own significant risk set and are naturally covert yet the legitimate amateur pyrotechnician operates unregulated to a certain extent.

To possess firearms and ammunition will require registration – information available to share with other agencies. Those who purchase and keep black powder in their homes will similarly be subject to licensing and record keeping, but to manufacture an explosive device for innocent purposes does not attract the same level of scrutiny.

Even the presence of oxygen cylinders would likely be shared with other responders due to the consequences of a fire in the home.

The laws regarding explosives manufacture are widely different around the world, in the United Kingdom at this time the *Manufacture and Storage of Explosives Regulations* is in force after replacing the *Explosives Act 1875* in 2005.

The basis for the Amateur Pyrotechnician being that you can manufacture up to 100grams of explosive for 'experimental purposes' without license or prosecution. Obviously if such materials were used to create damage, or injure someone (again the question of intent) then charges from Criminal Damage through to the Terrorism Act could be considered. The *Control of Explosives Regulations* could present a recourse for the authorities to manage such activities, however whilst licensing is required to 'acquire and keep' Blackpowder, no such controls exist on other



New: Vehicle Extrication Techniques training book by Holmatro

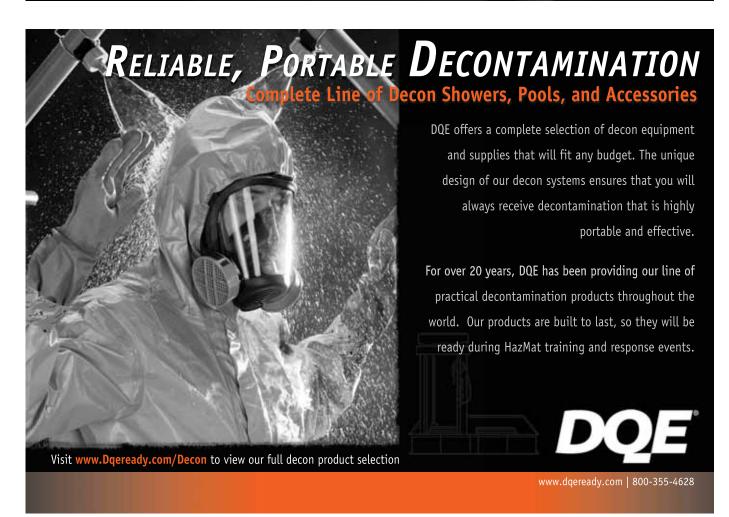
This 256-page training book, written by Holmatro Rescue Consultant Ian Dunbar, promotes a safe, methodical and casualty centered approach to vehicle extrication. Not only does it cover rescue tools and techniques, it also highlights key medical considerations and guides the rescuer through the process of efficient planning. All techniques described in the book have QR codes referring to videos showing how to perform these procedures.

App and posters

The book is part of the new Vehicle Extrication Techniques series, which also includes an app for iPad and Android tablets (search for Holmatro Extrication) and a poster series. All items will be available in multiple languages.

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HAZARDOUS MATERIALS



Looking at the potential cost to the public of the analysis and investigation of someone engaged such small scale activities; would the prosecution pass the complex 'public interest' considerations by a Crown Prosecutor who may not be familiar with the matters of explosives?

However, how would the next door neighbour, concerned family member or professional carer balance what could be an innocent hobby with the risks associated? The sight of chemicals being mixed, items being set off in back gardens and general garden shed chemistry can appear less than innocent in the media rich world we live in where precise details of terrorist bomb making techniques are reported direct from court complete with colour graphics and expert testimony. The hard work of Police and Security Services worldwide to educate Communities as to the risks of terrorism and promote vigilance enhances and ensures such awareness and knowledge further protects our communities.

Usually at this time the concerned person contacts the Authorities for assistance and advice, leaving the officer on the other end of the phone questioning if we are dealing with a hobbyist or a terrorist, and what actions are the best to maintain the safety of the individual and the community. The legal grey areas suddenly become a significant concern as the balance of safety and individual freedoms present a challenge to the officer sent to make a judgement call.

The Police in such circumstances face an almost impossible decision, to be accused of going over the top or underplaying the risks very much depends upon the risk perception of the accuser, if this should be covered by the media then the challenge grows significantly.

activities of a 93 year old man with advanced dementia. Living with his wife in a small terraced house, the man was not fully aware of his surroundings but could clearly remember making small banger type fireworks as a small boy. Small bangs came from the back garden as he would make his fireworks and then let them off for amusement. His wife said that it was the only time he appeared calm and happy when engaged in this activity.

pyrotechnic compounds, such as flashpowder.

In 2007, the team were contacted regarding the

The carer spoke to the Local Neighbourhood Policing team, who immediately came to the fireworks team for some technical advice. A unit was dispatched to the scene to find a Police Officer in discussions with the gentleman's wife.

Within the house we found the Gentleman sitting on his armchair mixing small amounts of chemicals, all available from local DIY stores, a lit cigarette in an ashtray beside him. The man would mix small amounts, wrap in stout paper and then head outside to set off the firework. In this case it was obvious that the Gentleman was a

significant danger to himself and his family, but had not engaged in any criminal activity. He had legitimately purchased materials, mixed in small quantities which he let off in his own garden; apart from the aspects of a Statutory Noise Nuisance he was technically doing nothing wrong.

The carer and the Gentleman's wife authorised the removal of the materials and a search was conducted to ensure nothing remained in the house that could be used for further fireworks, military bomb disposal and Fire Service Hazardous Material assistance was sought to test and package the materials for transport and disposal, again through the authorisation of the Gentleman's wife

But the one thing common to all incidents of this type I have attended is the 'doorstep conference'. Police. Fire Service and sometimes Social Services gathered to discuss what, if any offences have taken place and who has the power to do anything about it and protect the occupants.

I have personally attended an incident where a fifteen year old boy lost a finger as he had ignited his birthday present manufactured by his pyrotechnics enthusiast uncle. When attending the place of manufacture we were faced with a very impressive operation where items were manufactured for entertainment, but one man's industrial strength banger is another man's pipe bomb.

The internet has effectively let the Genie out of the bottle when it comes to learning how to manufacture many explosives, not just fireworks, so what can we do to control the dangers to those who enjoy fireworks as a hobby and those who live around them?

An interesting comparison can be drawn with the ownership of firearms in the UK, where following a number of tragic incidents many thousands of people had their legitimate pastime taken away in the interests of public safety, could the same fate be destined on those who draw pleasure in fireworks and pyrotechnics?

Whilst the supply of fireworks and other explosives is very carefully controlled in most countries, the supply of component parts, chemicals and technology is not. These are careful considerations legislators have to consider - the familiar balance of civil liberties against personal safety.

Chris Case is a Group Manager in Merseyside Fire & Rescue Service, Member of the Institute of Explosives Engineers, UK Chapter Director of the International Association of Bomb Technicians and Investigators and Trustee of the Royal Armouries



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DST-3P4	5.5	14885	18", 4-Blade	81 lbs.	23" X 23" X 21.5"
DDST-3P4	5.5	14885	18", 4-Blade	82 lbs.	23" X 23" X 21.5"
DST-3P4-L*	5.5	14885	18", 4-Blade	85 lbs.	23" X 23" X 21.5"
DST-3P4-6.5	6.5	17000	18", 4-Blade	91 lbs.	23" X 23" X 21.5"
DST-9P4	9	17500	20", 4-Blade	115 lbs.	26" X 23" X 21"
DST-13	13	22000	24", 4-Blade	136 lbs.	30" X 28" X 24"

ELECTRIC MODELS

Model	HP (Output (CFM)	Prop Size	Weight	Dimensions
E18SP	2	12000	18", 2-Blade	85 lbs.	21" X 21" X 18"
E18P4	5	22000	18", 4-Blade	88 lbs.	23" X 23" X 16"
EB18SP	1.25	12000	18", 2-Blade	90 lbs.	21" X 21" X 19"
EX18SP	2	12000	18", 2-Blade	110 lbs.	21" X 21" X 18"

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CONGRESSIONAL FIRE SERVICES INSTITUTE



Building Consensus on Capitol Hill



Bill Webb

In 1987, a former firefighter named Curt Weldon was elected to the U.S. Congress. A member of the Marcus Hook Volunteer Fire Department, the former fire chief turned federal legislator represented a congressional district on the outskirts of Philadelphia, Pennsylvania.

hortly after entering Congress, Weldon was working late one night in his Capitol Hill office with his staff when he detected the faint smell of smoke coming from outside his office. Opening the door to the hallway, he saw heavy amounts of smoke coming from the office of Jim Wright, Speaker of the House. At the time the congressional office buildings lacked proper fire detection and sprinkler systems so there was no way of alerting people inside the building to evacuate. Fortunately because the fire occurred in the evening hours, most of the members and their staffs had already departed. Yet Weldon realised a high level of complacency existed on Capitol Hill regarding the threat of fire and decided to do something about it. Shortly thereafter, he formed the Congressional Fire Services Caucus.

Since its establishment in 1987, the Congressional Fire Services Caucus remains one of the largest and most respected caucuses in Congress. Comprised of Republicans and Democrats alike, this bi-partisan caucus was designed for members

of Congress to work together to raise greater awareness about the role of the American fire and emergency services in protecting our homelands. Up until 2006, Weldon was the driving force behind the caucus, providing the energy and leadership to keep his fellow members engaged in fire service issues. But Weldon lost his bid for re-election and the responsibility fell on his former colleagues to fill the void to ensure that the fire caucus remained active. Fortunately, they did as the Caucus remains as active today as it did in the early years.

Caucuses are quite ubiquitous on Capitol Hill, but what makes the Fire Caucus unique is its working relationship with the Congressional Fire Services Institute (CFSI). Established in 1989, CFSI is a nonprofit, nonpartisan policy institute that works closely with Fire Caucus leaders to educate members of Congress about the challenges and needs of our nation's fire and emergency services. It is a privately-funded organization that serves as a confluence, bringing together all the major fire

CONGRESSIONAL FIRE SERVICES INSTITUTE



organisations to develop consensus on the paramount issues for public safety.

CFSI has a Board of Directors and staff, but it also has a National Advisory Committee (NAC) that helps the organisation establish its agenda on Capitol Hill. Comprised of 36 national fire and emergency services organisations, the NAC convenes semi-annually to discuss issues of common concern to our nation's career and volunteer fire-fighters, as well as fire chiefs, instructors, codes and standards organisations, fire marshals, manufacturers and service provides, and other elements of public safety. The adage "strength in numbers" is the mantra of the NAC – it is what enables the fire service to be a powerful force on Capitol Hill

Beyond the semi-annual meetings, CFSI facilitates meetings and conference calls with NAC members throughout the year to strategize on legislative issues. It also organises meetings between NAC members and congressional offices to discuss how they can work together to advance legislation pending in Congress.

Unfortunately, the acrimony and gridlock being reported from Washington, DC is true. Little is getting accomplished because the politics have driven a chasm in Congress. However, the fire service has achieved quite a few victories despite the gridlock, thanks in large part to the efforts of the Congressional Fire Services Caucus and the national fire organizations working together under the CFSI umbrella. Congress continues to fund the two major grant programs for the fire service: the Assistance to Firefighters (AFG) and the Staffing for Adequate Fire and Emergency Response (SAFER) grant programs. The fire service has also prevailed on a number of other issues - issues addressing public safety communications, public safety officer benefits, and funding for the United States Fire Administration/National Fire Academy.

In 2009, the Congressional Fire Services Institute conducted a fire service showcase on the National Mall. New technologies and equipment were on display. Education booths and demonstra-

tions were set-up to educate the public on fire and life safety measures. Lending their support, members of Congress and administration officials participated in the program as well. Following the event, one of the political journals did a story. It talked about the fire service and how active it was on Capitol Hill. It quoted a number of fire officials, but the most compelling quote in the story came from the chairman of the Congressional Law Enforcement Caucus. Discussing the differences between fire and police in terms of legislative agendas, he said that the fire service was more successful because "the fire service speaks in one voice"

CFSI is not the voice of the fire service; it is the organisation that enables the fire service to speak in one voice on the key issues that impact all fire-fighters and emergency services personnel. We are proud of our many accomplishments and always look forward to sharing our work and mission with firefighters – whether in the US or in other parts of the world.

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I certainly appreciate this opportunity to submit an article in International Fire Fighter Magazine and hope to continue sharing information about our work in Washington, DC.



Bill Webb has served as Executive Director of the Congressional Fire Service Institute since 1995. An accomplished writer and public speaker, Bill has delivered presentations throughout the US on fire service politics and has had his written work published in the major US fire service trade publications. He also serves as Vice Chairman of the National Fallen Firefighters Foundation, a nonprofit organization established by Congress in 1992 to provide care and support to the survivors of our nation's fallen firefighters. Bill can be contacted at bwebb@cfsi.org

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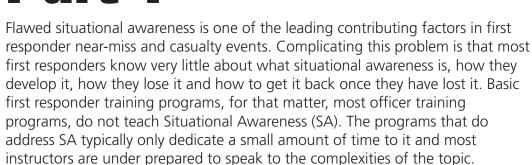




FLAWED SITUATIONAL AWARENESS



The Stealth Killer of First Responders Part 1





Dr. Richard B. Gasaway, Fire Chief (ret.)

he situational awareness-related issues cited in casualty reports often include: inadequate initial and ongoing size-ups, failure to continuously evaluate the risk versus benefits during the entire operation, ineffective communication of incident conditions, and failure to recognize hazards.

When asked, many first responders struggle to explain what it means to have SA. Even worse, many responders struggle to explain how SA is lost and what things can be done to keep it intact. In general, there is a lack of awareness . . . about awareness. How ironic.

Let's start by discussing what SA is. After that, you'll be in a better position to understand how situational awareness can be established, maintained, impacted, lost, and regained. I have heard several people offer simplistic definitions of situational awareness that, in some ways, capture the essence of the concept, yet do not do it justice. For example, I have heard it described as paying attention or where perception and reality meet. Can't argue with that, but what does that really mean?

To help you understand situational awareness in a meaningful way, I turn to the work of Dr. Mica Endsley, founder and President of SA Technologies. Endsley has written over 200 academic articles and several academic textbooks on issues related to situational awareness. Endsley (1988) defined situational awareness as a perception of elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status into the near future.

Stated another way, situational awareness is a first responder's ability to capture information – cues and clues (think of gathering up jigsaw puzzle pieces) from what is happening around you . . . then being able to put those clues and cues together to mean something (think of assembling some of the puzzled pieces to start forming a picture). . . then being able to predict future events as a result of what you have captured and the meaning you gave to it (think of looking a partially completed jigsaw puzzle and making predictions about what the completed picture will

FLAWED SITUATIONAL AWARENESS



look like). Endsley's research discovered there are three levels of situational awareness. Level 1 is the perception phase (this is where responder's capture the cues and clues). Level 2 is the comprehension phase (this is where responders put those cues and clues together to mean something). Level 3 is the projection phase (this is where responders predict future events based on the picture formed in the previous levels (1 and 2).

This is important to understand. If, for example, you fail to capture the right cues and clues, it will impact your ability to understand what is happening. This, in turn, will impact your ability to predict what is going to happen next. Chances are pretty good that you have read an after-action report or watched a fire scene video where something went wrong and said to yourself: "How could they NOT see this coming?" or perhaps you thought to yourself: "That could never happen to me."

First of all, it is easy to read casualty reports or watch incident videos and become angry because what you see coming may appear to be SO obvious. Well, it wasn't obvious to the responders operating at the incident where something is about to go wrong. Keep in mind, no responder ever goes to an incident thinking to themselves "I'm going to lose my situational awareness on this call . . . make some bad decisions . . . and jeopardize my safety and the safety of other firefighters." Yet it happens – a lot!

The sad part of this is, most of the time the responders never see it coming until it's too late. Maybe at the moment when the tragedy occurred they were doing the same thing, the same way they'd done it for years. And because they'd never experienced even so much as a minor near-miss event, they didn't see anything wrong with what they were doing. Maybe the responders thought they had good situational awareness. Then, it happened . . . a catastrophic casualty. The first misnomer you need to come to grips with is, the loss of situational awareness can afflict any first responder and impact their decision making and there may be no warning signs at all.

Issues with flawed SA and its impact on decision making has been studied in a number of professions where decisions are made in dynamic, fast-paced, ever-changing, high risk environments. Extensive research has been done to understand

SA among military battleground commanders, airline pilots (especially when something has gone wrong and the flight is in jeopardy), and surgical teams. From this research have come some very important lessons that first responders can learn from. These include:

- A responder with poor SA can still make a good decision, if only by luck.
- A decision made with good SA can still have a bad outcome.
- Maintaining SA requires a physical, mental and emotional commitment to paying attention.
- What to pay attention to . . . is <u>NOT</u> always obvious.
- A first responder's attention is drawn away by things that are loud, bright, moving, or into close proximity of the responder (moving toward him or her).
- Responders rarely realize they are losing their SA until it is too late.
- Responders (in fact, all humans) can only remember seven (+/- two) unrelated pieces of information. Stress may reduce that number to five

Unfortunately, most first responders simply do not know what they need to know about SA, how it is developed, how it is maintained, how it is lost, or how to get it back once it is lost. That was the position I was in just seven years ago. Then, in 2004 I went back to school to earn a Doctor of Philosophy degree. In that journey I was provided with a wonderful opportunity to conduct original research on first responder SA and high-stress, high consequence decision making. I was stunned to learn what I didn't know about these topics after serving as a firefighter, company officer and fire chief for 25 years.

I was also frustrated and angry because no one had ever taught me these catastrophically important lessons. I couldn't understand how I didn't know this stuff already. I'd taken no less than a dozen strategy and tactics, incident command, and officer development classes throughout my career. Yet here I was, seeing for the first time that some important lessons had evaded me. It was a sobering experience.

Barriers to Situational Awareness

The purpose of my research was to answer a very simple, yet perplexing question. For many years I had read casualty reports and near-miss reports. While doing so, I kept asking: *How could they not see this coming?* There seemed to be so many clues, signs, symptoms and indicators the incident they were operating at was going to end in a disaster. But why? Why could they not see it coming? It was like they were blind and, in some cases, deaf to the things happening around them.

Early on when I would come across these cases I would find myself passing judgment on the persons operating at the incident. I found myself making up excuses for them – lack of training, lack of experience, lack of staffing, lack of equipment, incompetency, etc. I got so I was pretty good at categorizing each incident into a convenient, easily justifiable category. But it still did not answer the question – How could they not see it coming?

So that was among the questions my research would seek to understand. In the process, I uncovered "Barriers" to situational awareness. Simply

FLAWED SITUATIONAL AWARENESS

stated, a barrier is something that prevents the formation of SA, causes SA to erode or prevents eroded SA from re-forming once lost. When I started on this journey I had no idea how many barriers there would be. I thought there might be fifteen or twenty.

Boy, was I wrong! Twenty turned to forty, then sixty, then eighty, then one hundred. When I was done there were one hundred and sixteen barriers on the list! I was stunned. With so many ways our SA could be impacted, how could we ever get it right? It was at that moment I had an epiphany. After 25 years in the fire service with over 20 years experience as a company officer and incident commander, I now realised I'd not been a GOOD company officer and fireground commander. I'd been a LUCKY company officer and fireground commander. When it came to understanding the barriers to situational awareness, I had been the incompetent one. It scared me.

Through an exhaustive search of the existing literature, coupled with interviews conducted with expert-level fireground commanders, I have been able to amass this extensive list of SA barriers. As I assembled this list, similar barriers were grouped together, resulting in 12 categories of SA barriers that included:

- 1 Staffing
- 2 Communications
- 3 Data/information management
- 4 Physical and mental stress
- 5 Workload management
- 6 Attention management
- 7 Mission/goals
- 8 Mental models
- 9 Human factors
- 10 Command location
- 11 Command support, and
- 12 Team/crew performance

Each of these categories contains a list of barriers. For example, in the staffing category, there are potential barriers to responder SA that can arise from understaffing, overstaffing, unpredictable staffing, quality of staffing, response time delays, lack of experience, and inadequately trained personnel. As another example, in the communications category, there were potential barriers to responder SA from issues with verbal and nonverbal communications, progress/update reports, misinterpreted words or phrases, incomplete communications loop, missed radio communications, radio equipment problems, non-compatible radio equipment, using multiple radio channels, too much radio traffic, and crews not willing or unable to communicate by radio. As you can quickly see the list of potential SA barriers is rather extensive. While there's not enough space to list and discuss every barrier in this journal, here, I will share the most important lessons I learned from my interviews with first responders about how their SA

The decisions made by first responders impact the safety of fellow responders as well as the outcome of the event. But responders are human and, thus, are subject to limitations and errors. The fireground is a dynamic, complex decision making environment that is critically dependent on forming and maintaining strong SA.

There seem to be several identifiable factors that impact responder situational awareness. First, is incomplete size-ups and, more specifically,



failing to read the smoke and fire conditions, failing to assess building construction and the deterioration of the component of construction, and failing to conduct a realistic assessment of savable lives (what some might term completing a survivability profile).

Second, responders are underestimating the speed in which the incident is progressing. This can cause a responder to get behind in the incident and apply strategy and tactics that are not appropriate because the incident has progressed beyond their plan.

Third, responders are overestimating their own abilities as well as the abilities of their fellow crewmembers. This is happening for several reasons, including not having enough personnel assembled to get the job done and the assemblage of personnel who lack the training or experience to be efficient and effective at the assignments they are given.

Forth, responders are stressed from a sense of obligation to be tactically aggressive. This pressure may come from the organization's culture or from upset customers who have unrealistic expectations of what the fire department could or should be doing to mitigate their emergency. This can lead to a pressure to perform heroically and cause responders to take excessive risks, despite a high level of awareness of the dangers present in the situation.

Finally, responders struggle because they are focused on the wrong things or they try to split their attention among too many tasks – multitask. This is a big mistake. The human brain cannot multitask when it comes to paying attention. Some responders think they're good at multitasking when in fact, they are not multitasking at all. They can only give their attention to one task at a time. Think of it this way. On your personal computer open up an email window and a word processing document. Now, multitask by typing an email and a sentence on the document at the same time. It can't be done. You can go from one to the other and back but it simply is not possible to complete both tasks at the same time. The same is true for paying attention. You alternate your attention between tasks - back and forth but no multitasking. The brain cannot do it.

So far I have provided you with a working definition of situational awareness and provided some examples for how situational awareness can be impacted. In the next issue, I will provide you with ten best practices, based on my research, for developing and maintaining situational awareness.

Images courtesy of Fire Chief John Buckman III

Dr. Richard B. Gasaway

joined the fire service in 1979 and has worked for six emergency services agencies including serving as a career fire chief for 20 years. Chief Gasaway's doctoral research is focused on the neuroscience of decision making under stress and the barriers that impact situational awareness. He has delivered more than 2,000 presentations on safety and leadership topics throughout the United States, Canada, England, Hong Kong and Australia.

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MANUAL HANDLING



If only humans came with handles

the undiscussed cause of back injuries

Anyone who has been in the Fire and EMS industry for more than a couple years typically knows of a few staggering statistics concerning the high back injury rate of prehospital providers. There have been studies conducted starting in the 90s through today that all say the same thing: EMS personnel consistently have more reported back injuries than any other industry. According to the NAEMT (National Association of Emergency Medical Technicians), EMS practitioners are seven times more likely than the average worker to miss work as a result of injury.



Rick Binder

s a result of these studies, departments have taken many measures to reduce back injuries. Examples of such measures include: purchasing mechanical lift equipment, requiring pre-hire ergonomics testing, and performing a stretching routine at the beginning and end of every shift. These are all very well intentioned actions, and I commend every department that has taken any action in protecting the backs of the prehospital workers. But the fact of the matter is, back injury rates are continuing to climb.

There are a minimum of five lifts that a prehospital worker will perform on a typical transport:

- 1 Lifting the patient up from the floor;
- 2 Lifting the stretcher to waist height;
- 3 Loading the stretcher into the ambulance;
- 4 Unloading the stretcher;
- **5** Transferring the patient from the stretcher to the hospital bed.

Thanks to Stryker and Ferno, three out of five of those lifts can be eliminated through the use of a power stretcher.

From the year 2008 to 2011 the number of

treated lower back injuries steadily increased from 4200 to 5800¹. This year 2008 was the release of the first commercialised power cot in America. This means the back injury rates continued to climb even after the invention of the power stretcher.

These statistics were not what anyone was expecting, and left people asking "do the power stretchers really save our backs like the manufactures say they will?" To my knowledge there are no published peer-reviewed studies proving that power cots reduce back injuries. The question we should be asking ourselves is, "do we really need a formal study to prove that a lifting related injury cannot happen if a lift is not performed by the caregiver?" Common sense will show that any time a prehospital worker can avoid a lift, they are adding years of health to their back. Every lift counts. The actual cause of back injury is often a series of incidents with years of weakening from repetitive microtrauma, rather than a single incident². Therefore, it is not difficult to see the value of power cots, which are reducing over half the amount of lifts performed on an average transport call.

79

MANUAL HANDLING



We know that the majority of back injuries are caused from manually lifting patients³. If power stretchers can eliminate three of the five manual lifts, we can deduce that manually moving the patient onto, whether to a stretcher, stair chair, or other location, is the most dangerous task a prehospital provider will perform during an average transport call.

There are many occupations where manual lifting is required systematically throughout the day. One could even argue that some manufacturing jobs require more manual lifting than in EMS. If that is the case, why are back injuries so much more prevalent in EMS?

A study in the Francophone region of Switzerland was conducted to try and answer that question. From this study they determined what every prehospital provider already knows. Every call is different than the one before. No call is the same. The unpredictable environment in which their work will take place, coupled with awkward and constraining postures, is a major cause of back injuries⁴.

"Lift with your legs and not your back" has been preached to us since we were young. This adage is a great rule to follow, but it's just not that simple for a prehospital provider. The environment and condition of the patient heavily contributes to:

- Reaching while lifting
- Poor posture
- Bad body mechanics
- Twisting while lifting
- Bending while lifting
- Over extending
- Single member lifts
- Poor footing
- Lifting with sudden forceful movement (shock loading)

This list delineates some of the prime reasons for injury during manual patient handling. In order to lower the risk of back injuries we need to look at what is causing prehospital providers to practice these bad habits.

A lift assist call might look like this:

Sue has been struggling for 2½ hours trying to get herself out of the bathtub. She knew due to her age and weight she shouldn't be trying to bathe herself, but the home caregiver "hadn't had time" and Sue wanted to feel clean. Sue is now losing sensation in her lower extremities and it is now your job to get Sue up and out of that tub.

Prehospital providers tend to utilise improper ergonomics because they have no way to grab hold of the patient during routine procedures like the one described above. If only humans came with handles! Proper lifting ergonomics cannot be properly followed when the providers have nothing to grasp.

The providers at this point have two options, they can improvise a way to get Sue out of the tub, or they can use specialized lifting equipment.

Improvised techniques might include:

- **1** Sending the youngest/strongest provider in to provide lift assistance by getting behind the patient and lifting by the patients armpits.
- **2** Using a sheet in different variations to get the patient up.
- **3** Using a soft stretcher to position under the patient.

Or heaven forbid

4 Attaching the KED (Kendrick Extrication Device) to help lift the patient.

Every one of these techniques is widely used, and every single one of them puts either the patient, provider, or both at extreme risk for injury. Unknowingly, we have handed down bad patient handling techniques and improper ergonomics from one generation of prehospital providers to the next.

The typical techniques utilised in lifting the patient up from the floor are outdated and play a large role in the probability of sustaining a back injury on the job. Using the right tool for the job is crucial. A wheelbarrow would never be used to move a patient to the ambulance instead of a stretcher. Just the same, we should not be using sheets, soft stretchers, or KED's to help get the patient up off the floor.

Every ambulance needs to have a proper tool that is specifically designed to help lift patients from the floor. There are a few products on the market that are designed to help with patient lifting, but keep these factors in mind when looking into purchasing one of these devices.

- **1** The device needs to be easily attached to the patient. The providers will rarely use the device if it is not simple to attach to the patient.
- 2 There need to be multiple handles. Regardless of patient positioning, the provider will have access to multiple handles, allowing for the best lifting posture. Remember, patients are often found in inconvenient locations and positions.
- 3 The device needs to support the entire torso of the patient. By supporting the torso, the providers need not to rely on the patient's core muscle strength to maintain balance and posture. Lifting devices that only go around the patient's waist are a potential risk to both the provider and patient by creating a hinge or pivot point.

The Binder Lift is the only device on the market that fulfills the above criteria. This is because it was made specifically for the purpose of lifting the patient off the floor or out of a chair. It can also be left on the patient to help with the next manual lift of moving the patient off the stretcher onto the hospital bed.

Any department that seeks to initiate, or is already utilizing, a back injury reduction program must have protocols that require the providers to use specialized equipment to aid in manual lifting. As soon as we start using the right tool for the job that allows for proper ergonomics to be followed, back injuries will significantly decrease among prehospital providers.

¹ **Reichard, A.** Emergency Medical Services Workers. *Center for Diseasa Control & Prevention.* [Online] June 21, 2013. [Cited: June 30, 2014.] http://www.cdc.gov/niosh/ topics/ems/data.html. ² **OSHA.** OSHA Technical Manual. *Osha.gov.* [Online] January 20, 1999. www.osha.gov/dts/osta/otm/

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⁴ **Arial, M.** Exploring implicit prventive strategies in prehospital emergency workers: A novel approach for preventing back problems. *Applied Ergonomics*. [Online] December 19, 2013. http://dx.doi.org/10.1016/j.apergo.2013.12.005

Rick Binder is certified in high ropes rescue, white water rescue, search and rescue, and as a National Registered Emergency Medical Technician (NREMT). When his father, Dan Binder, designed a new and safer way to lift Rick immediately joined in the pursuit to protect the backs of his fellow pre-hospital providers by showing that there is a better way to go about lifting.

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Mark McGeever

Scottish Fire and Rescue Service (SFRS) crews were hailed as heroes after battling for hours to prevent an intense fire at the famous Mackintosh building in Glasgow city centre from completely destroying the iconic structure and the treasures stored within.

esigned as a home for the Glasgow School of Art by architect Charles Rennie Mackintosh and completed in 1909, the building was severely damaged when fire took hold in its basement on Friday 23rd May. Stocked full of combustible materials and featuring countless hidden voids, the fire quickly spread over every floor to engulf its west wing.

With orange flames emanating from the rooftop and a cloud of thick black smoke visible across Scotland's largest city, aggressive firefighting operations over the coming hours successfully beat back the blaze. By 9pm, as headline writers for the morning's papers prepared to declare the treasured building's complete loss, SFRS was able to announce early indications suggested more than 90 per cent of the structure and 70 per cent of its contents had in fact been saved.

Chief Officer Alasdair Hay told IFF Magazine: "The response throughout that Friday afternoon and evening was an example of firefighting at its very best. Saving lives was of course the crews' priority from the outset but they also made a truly massive effort to protect both the iconic building and the priceless works of art and unique architecture it contained.

"People saw the intensity of this blaze and were amazed our firefighters were able to stop it before the entire building was destroyed. Preventing that and saving the great majority of the irreplaceable contents was a remarkable achievement – and it was only possible because all of our personnel put absolutely everything they had into the operation.

"Their determination, courage and professionalism were all very apparent and that has been reflected in the tremendous show of support we have received since the incident. People from around the world have been in touch with the service to express their gratitude for our crews' work at the scene."



Mackintosh:

ing in Glasgow from a devastating blaze

Played out in the heart of one of the UK's largest cities, television cameras beamed live images of the operation that were picked-up by news outlets around the world and generated frenzies in both traditional and social media. For almost 48 straight hours the service's head of communications and its media officer for the west of Scotland responded to a torrent of queries, issued statements and ensured the effective flow of accurate information.

Messages of thanks for the fire service arrived thick and fast with hundreds sent via Twitter and Facebook as well as from elected representatives visiting the scene. As dampening down operations continued into the Saturday afternoon, ministers from the Scottish and UK governments and the leader of Glasgow City Council arrived to deliver their personal backing to the firefighters involved.

In the weeks that followed a special dedication was made to SFRS at the Scottish Design Awards and the Glasgow School of Art presented its highest accolade – an honorary Newbury Medal – inscribed with the words: *Guardians of The Mackintosh*.

Perhaps the most notable expression of gratitude however was a simple card placed around the neck of Glasgow's Citizen Firefighter statue. Left overnight by an anonymous member of the public, it had the words 'Thank You' printed in Mackintosh's signature style.

Assistant Chief Officer David Goodhew, the SFRS director of response and resilience, was the incident commander throughout most of the Friday afternoon and into the evening. He said: "We could not have asked any more from our crews. They drew upon their training and experience to conduct a highly aggressive firefighting operation and their performance in the face of a very challenging fire was simply terrific.

"The scale of the task that confronted our fire-

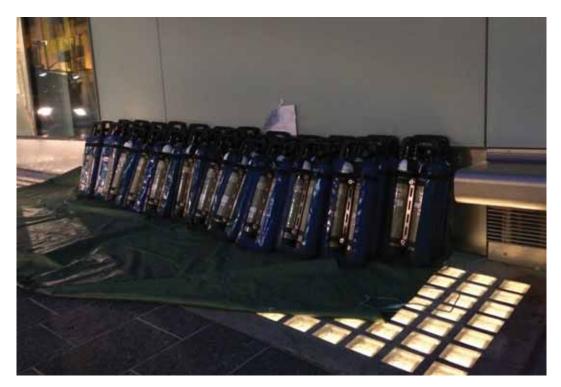


fighters was clear. This was a listed building of huge national and indeed international importance which had wooden panels throughout and hidden voids and levels. The nature of its use meant it was also heavily fire-loaded – so it had all the features needed for a fire to spread quickly across a great distance and to burn for a long time.

"We decided very early to conduct both internal and external firefighting operations and throughout Friday we had something like 120 firefighters in BA working to prevent the total loss of the building. A point was identified where we felt the fire could be contained and teams were placed at strategic spots



GLASGOW SCHOOL OF ART FIRE



to create a virtual wall of firefighters. They never wavered and their supreme effort and professionalism meant the fire never crossed that line."

The speed with which the service responded to the incident was praised by the public and widely noted in the press. From receiving the first emergency call shortly before 12:30pm it took less than four minutes for three fire engines to reach the scene. Teams in breathing apparatus immediately entered the building to begin what would be one of Scotland's most significant firefighting operations in recent times.

Flames had already spread beyond the basement and were rapidly progressing through every floor of the structure. Channelled through voids within the Victorian sandstone building, the fire quickly reached and broke through its roof.

Severe smoke logging affected three floors and the scene was soon sectorised, allowing the fire to be tackled from several fronts. Within thirty minutes ten firefighters were operating inside the Mackintosh using four high pressure jets, while two aerial rescue pumps were deployed to douse the flames from above.

Mark McGeever is currently the Scottish Fire and Rescue Service media officer responsible for the west of Scotland. Formerly a journalist writing for local newspapers across Greater Glasgow as well as sports publications, Mark became the editor of a digital-only news magazine before moving into corporate communications.

Crews from across Greater Glasgow flooded into the city centre and were gradually joined by others from around Scotland as SFRS ensured those on scene had the resources needed to bring the blaze under control. With around 30 per cent of the building well alight a strategy was devised to create a fire break that would effectively divide the Mackintosh in two. It gave firefighters a chance of saving the building.

Seven hours of intense firefighting operations saw the frontline crews constantly on the brink of being driven back by ferocious heat and flames. Somehow the wall of firefighters remained fixed and, in the evening twilight, a brighter than expected picture began to appear.

With the fire successfully under control and crews extinguishing hotspots and continuing salvage operations, Assistant Chief Officer Dave Boyle – the SFRS director for the West of Scotland – revealed an outcome few had expected: Firefighters had saved the Mackintosh and the great majority of its contents.

He said: "Everyone was also very aware of the value of its contents, not just in terms of priceless artworks but also the importance of students' work. While teams were battling to control the flames others were already implementing a salvage plan developed between our officers and art school staff that was designed to save everything that could possibly be saved.

"Fighting the fire from both inside and outside the Mackintosh gave the best chance of stopping the flames and the early decisions made by our crews and incident commanders proved crucial. The performance of the firefighters was incredible – it took a tremendous amount of courage and determination to prevent what was a very intense fire completely engulfing the building.

"Their efforts were extraordinary and the outpouring of support since this incident been greatly appreciated. It means a lot to our crews to know their work has been recognised and admired by so many people at home and abroad."



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Being in the right pl





Jean-Francois Bolduc

As a photographer I usually find myself in a studio or on location undertaking photographic commissions which have been pre arranged well in advance.

n the night of December 13th 2013, I was in my 14th floor apartment in the Montcalm quarter of Quebec, preparing for a forthcoming business trip. All of my photographic equipment was on the dining room table as I was checking it prior to packing it ready to leave for Hawaii.

I happened to look out of my patio doors and saw an intense orange glow coming from the floor below me. Although at that time I could not see any flames or smoke. At the time I did not consider the weird light as being out of the ordinary as everything was calm and I could not hear any sirens.

A few seconds later I heard people screaming and shouting. They were shouting 'get out of

here' and I suddenly realised there may be a fire in the building where I live and in the apartment below mine. I quickly put my coat on and returned to my balcony for just a second to try and see where the fire was and to ascertain if I needed to get out of the building if it was my building that was actually on fire!

From the balcony I was able to see flames coming from a small shed like structure located on the balcony of the top floor apartment opposite mine. At this moment I saw a terrified father running out of the building carrying his crying daughter in his arms – there were no other sounds just the sound of the little girl crying uncontrollably.

I quickly thought to myself, 'what can I do to





86

ace at the right time



help?' – the only thing I thought I could possibly do was to get back inside my apartment and put a lens on my camera and photograph the events unfolding before me. I wanted to demonstrate to the world the efforts of the firefighters who were responding to the scene and how their courage, skilful actions and team work was necessary to fight this fire. I subsequently found out that this was a four alarm fire.

During the next hour I stood on my balcony in temperatures between -15 and -20 taking photographs as the firefighters went about their work in a controlled and professional manner. They were battling with the plummeting temperatures of a Quebec winters night and the effects this has on firefighting operations.

I witnessed the team work between the firefighters and throughout the incident never saw a firefighter working alone – they were always working together as a team. The only photograph



which showed a firefighter alone was the one where his colleague was engulfed in the swirling smoke

After the flames and smoke died down, I returned to my apartment, with ice cold hands, and took my time to edit the photographs in black and white. I was amazed with the photographs I had taken and decided that I must give copies of them to the firefighters who attended the fire.

I have also had my photographs published in the United States and Canada. The following website contains video footage of the fire which can be accessed at www.zone911.fm93.com/ actualites/incendies/item/17712-incendie-majeurdans-le-quartier-montcalm-a-quebec

I am also offering to personally sign copies of these images for readers of International Fire Fighter magazine in addition to a 10% discount (discount code: iffmag) until November 1st 2014 – please visit my website for further details.



Jean-Francois Bolduc is a French Canadian living in Quebec, Canada. He is a professional photographer who travels the world undertaking photography commissions

For more information, go to www.jfbolduc.com

87

INTERNATIONAL FIRE FIGHTER

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ADVERTISERS' INDEX

Alert Disaster Control	4 & 78
Angus Fire	44 & 45
Bristol Uniforms	36
Bullard Inc	43
Cutters Edge	81
Dafo Fomtec	IBC
DQE Inc	67
Dr Sthamer Hamburg	11
Dynax Corporation	70
Emergency Services Show	9
Emergency Services Training Institute	,
(Texas A&M)	39
FDIC 2015	56 & 57
Ferrara Fire Apparatus Inc	33
Firebug Company	17
Flir Systems	49
Fol-Da-Tank	18
Groupe Leader	55
Haagen Fire Training Products	25
Holmatro	67
ISG Infrasys	40
Kussmaul Electronics	17
Lift Fire	25
Magirus	73
Meiko Maschinebau	64
MICC Ltd	32
MSA	60
Noha Norway	17
PAB Akrapovic	13
Pacific Helmets (NZ) Ltd	14
Packexe Smash	34
Paratech Inc	37
Podab	30
Pyrolance LLC	74
Rosenbauer International	OBC
Russian Helicopters	22
Sapphire Complete Training Concepts	21
Scott Safety	47
Seiz Technical Gloves	54
Skedco Inc	7
Solberg	50
Super Vacumn Manufacturing	31
Task Force Tips Inc	IFC & 1
Teikoku I-Sen Co Ltd	27
Texport	49
Unifire Power Blowers	69
Waterous Company	53
Wehr Engineering/Glasmaster	21 & 39
Yone Corporation	2

88 INTERNATIONAL FIRE FIGHTER







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REPORTING TO MUNICIPAL, INDUSTRIAL AND FIRE TRAINING PROFESSIONALS



G-Force Nozzles: The Inside Story

Based on a highly customizable global nozzle platform design, the unique G-Force series of fixed, selectable, and automatic nozzles combine over 40 years of Task Force Tips design innovation and experience into true next generation firefighting tools. Manufactured exclusively at TFT's USA production facilities, the G-Force series is supported by an extensive infrastructure of 24-hour technical service representatives, on-line documentation, digital video training library, exclusive product serialization and tracking capabilities, and a proven 5 year product warranty. Incorporating unique performance components such as a stainless steel slide valve, inlet debris screen and protective fog pattern choices, the G-Force series delivers high performance and rugged dependability.

Serialization provides track-ability and immediate access to on-line operational instructions

Integral Inlet Screen prevents debris from entering nozzle and affecting stream quality

Stainless Steel Slide Valve provides turbulence-free flow control when gated

Color-Coded Polymer Pistol Grip, Valve Handle and Covers offer rugged durability in harsh firefighting conditions my.tll.com/F5

Your Choice of Fixed,
Swiveling, Threaded, Storz or
Articulating Inlet Coupling



Flush without nozzle shutdown or pattern adjustment

The NEW GLOBAL FORCE in Nozzles



For a complete list of FM Approved models visit newforce.tft.com.

NFPA #1964 Compliant Integral Tactile Indicator provides optional preset pattern selection or factory set lock out

Choice of:

- Fixed Metal
- Fixed Molded Rubber
- Spinning Stainless Steel (shown)

Choice of:

- Fixed Pressure and Flow
- Selectable Flow with Fixed Pressure, or
- 3 Automatic Pressure and Variable Flow Choices

Choice of:

- Tip Only
- Shutoff
- Shutoff with Grip Models

Bonded Rubber Bumper provides maximum durability in harsh conditions

Large Index Ring with Indicator allows easy flow, pressure or flush selections with a gloved hand

Lightweight Hard Anodized
Aluminum Alloy Body includes
permanent laser engraved
operational markings and
highly visible reflective labeling



G-Force

YOKE PROFILE 751-SIR. SONAR Plus The Patry

Search out by SONAR and pinpoint with the Underwater Camera Head! Great result in dark and cloudy waters!

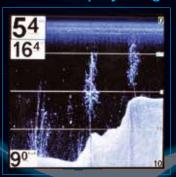
With the unique PROEYE 751-SNR SONAR Plus, operators can see sonar images from the SONAR System and real-life images captured by the Underwater Camera Head at the same time. The forefront technologies built into SONAR provides clear images even when searching the dark or cloudy waters of lakes and rivers.

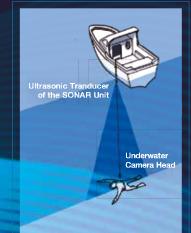
The system is designed compactly for optional use for various types of search & rescue operations.

GPS System indicates exact location on the display.

SONER Display image

U/W Camera Image Display





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Publishers David Staddon and Mark Seton

Sales Manager

Mark Bathard

Contributing Editors
Simon Burnett-Boothroyd, Doug W.
Cincurak, Paul Darley, David Dickson,
Dr. Richard B. Gasaway, Paul Gibson,
Tom Guldner, Rachel Hemsley, Andrew
Henry, Jessica King, Ean Lewin, Gary
Parkinson, Dave Pelton, Michael C. Ruthy,
Michael Warmuth, Duncan J. White.

Senior Designer Richard Parsons

Web and IT Manager Neil Spinney

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Contents

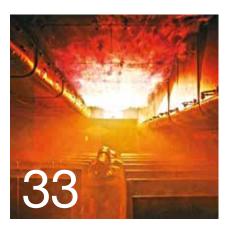
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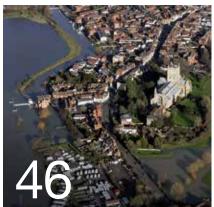
REGULARS

- 5 IFF Comment
- 6 News and Profiles

FEATURES

- 23 There's No LNG In My District ... Think Again!
- 29 Global Progress on PPE Standards
- 33 Airport firefighting protection and training for unique hazards
- 38 Trends in High Volume Pumping
- **42** Russian Helicopters
 Airborne Fire Brigade
- 46 Are You Ready for the Next Disaster?
- 51 Drugs and alcohol and what is it to the Fire Service?
- 55 Thermal Imaging Camerasthe Future of Firefighting?
- 59 Fire and Ice
- 65 Firefighting Foam– Making Water Wetter
- 71 New State of the art Fire Behaviour training centre
- 74 Rotterdam-Rijnmond Fire Brigade chooses TEXPORT
- 77 The Stealth Killer of First Responders: Part 2
- 80 New Car Technology: Part 1
- 84 Leadership & Lifelong Learning for Officer Development
- 88 Advertisers' Index





















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Paul Darley

Paul Darley is President & CEO of W.S. Darley & Co. He is a Past President of the Fire Apparatus Manufacturers Association (FAMA) and served on the Board of Directors of Fire & Emergency Manufacturers & Services Association (FEMSA). He holds a BS Degree in Marketing and Finance from Marquette University and an MBA from Northwestern University's Kellogg School of Management.

The Millennials are Coming

From fighting fires to onboarding Millennials, times are changing. Embrace the changes.

ver the past 30 years, I've had the opportunity to visit fire services in more than 75 countries around the world. It's always humbling to meet with our customers, and it's an honor and privilege to be in an industry where we can assist those who give so selflessly.

American writer and humanist Kurt Vonnegut realized their contributions to society when he wrote, "I can think of no more stirring symbol of man's humanity to man than a fire engine."

A lot has changed over the years. Firefighting technology has seen significant advancements, including compressed air foam systems (CAFS), ultra-high pressure, water mist, touchscreen control panels, and on-board water purification.

The single biggest change that I've seen is the number of fires, at least in the USA. While your department may still have a name with "fire" in it, let's face it fighting fires is not where you spend most of your time. This is largely due to better fire prevention, including more stringent electrical and construction codes, fire sprinkler systems, fewer smokers, and flame resistant products.

The number of fires around the world is a fraction of what it used to be when I joined our 100-year-old family business. It might come as a surprise to you, but in 2013, less than four percent of all fire service responses in the USA were actual fire calls. According to NFPA statistics, roughly 65 percent of calls were for medical aid or EMS related. I encourage you to download the complete report from the NFPA website at www.nfpa.org.

The amount of statistical information on USA fire services in this report is extraordinary, and it probably reflects conditions in your country. Last year, the New York City Fire Department (FDNY) was the busiest fire station in the USA, responding to over 1.4 million calls. However, less than two percent of those calls were for

Don't get me wrong: firefighting is still critical regardless of where you live. But you, and your equipment, should change with the times. While the fire apparatus, equipment, techniques and methodologies may vary from country to country, progressive fire departments around the world are becoming more practical in their approaches.

The hottest trend in the USA, for example, is toward multi-purpose vehicles. These vehicles still have a substantial pumping capability, but the pumps take up much less of the vehicle's overall footprint. This frees up space to carry more equipment for all the other responses, in a more compact package that allows for better vehicle maneuverability. These vehicles meet the true needs of today's fire service, rather than historical perceived needs.

In China, on the other hand, major cities have embraced our most sophisticated products, such as CAFS. The Chinese are not hamstrung by traditional

firefighting methods, like many in the USA. With the explosion of high-rise housing, China simply needs the best equipment to protect its cities and citizens. Its fire service conducts research and then implements decisions quickly.

No matter where you live, two things haven't changed: First, we're still "putting the wet stuff on hot stuff," albeit at a significantly slower rate than we were just 10 years ago. Second, men, and a growing number of women firefighters, still fight fires similar to how they were fought for centuries. There isn't a magic pill. And while robots may have a place in the fire service, when it comes to fighting fires, they have not replaced humans, and probably never will.

That means for your department to grow and thrive, you'll need to onboard and inculcate new members. Most likely, they'll be "Millennials," those who are roughly 18-35 years old. Never before has one generation been more analyzed and scrutinized then the Millennials.

I'm a data-driven manager, and while I don't like to stereotype, you can't ignore the statistics about Millennials. To attract these fine young leaders, an organization needs to explain its vision, be transparent, provide encouragement and feedback, and allow for upward mobility.

According to a 2014 survey by the National Volunteer Fire Council, recruitment and retention is one of the biggest challenges facing volunteer fire departments today. New members are the lifeblood of any organization. Properly attracting, onboarding and training them is critical to long-term success. Our military customers know this better than anyone.

A 2010 Pew Research Center study found that Millennials place a higher priority on helping people in need (21%) than having a high-paying career (15%). If this is correct, then why are volunteer fire departments in the U.S. having recruitment challenges? I don't have the answer, but perhaps part of it has to do with leadership's inability to listen and then adapt to changing times. I find myself caught in this trap at times.

Whether you're a career or volunteer department, it's critical that today's fire service leader be constantly listening to this new generation - and I mean really listening. This generation is tech savvy and filled with ideas on ways to improve your department's level of service.

At Darley, most of our breakthrough ideas come from truly listening to our customers and employees. Whether volunteers, employees or customers, all stakeholders need to have a voice and be heard. The quickest way to turn off any group of constituents is to not listen. Action needs to be taken based on input. And if you can't implement certain changes, your constituents need to know why.

At Darley, we're going to continue to embrace and learn from Millennials while slowly adapting our culture. I would encourage your organization to do the same.



News

Delta Fire at Intersec Dubai 2015

Last year's Intersec Dubai 2014 proved highly successful for UK based Delta Fire who are delighted to announce their continued attendance in 2015.

Delta will be showcasing a number of their UK manufactured products which have achieved global acclaim in recent years with a particular focus on Fire Nozzles and Foam Fire Fighting Equipment.

With an export client base in more than 65 countries Delta's Export Team are rapidly expanding the Delta brand on a global scale. Premium quality, UK manufactured products are now recognised as providing the very best in performance, durability and long-term value for money in this very demanding sector, perhaps best endorsed by Delta's recent export successes in China.

The full range of Delta's Professional Nozzles will be on display including the well-respected Attack & Automatics now

in service across multiple sectors worldwide. Dubai is in the top 5 countries in the world in density of high rise buildings and Delta's dedicated High Rise Nozzles will undoubtedly be of particular interest again at the 2015 show.

Delta's UK manufactured Foam Inductors, Branchpipes, Hi-Ex Generators and Mobile Foam Units will be on the stand and visitors will have the ability to meet the Technical Team behind the design of a hi-tech range of product at the forefront of Global Fire Fighting.

With a vast accumulation of Industry knowledge and expertise in successfully exporting their products around the world Delta's Export Team welcome the opportunity to meet prospective and existing customers onto their stand in the UK Pavilion.



For more information, go to www.deltafire.co.uk

Fhoss are Safely Lighting the Way

Have you ever found yourself out at night on a job and unsure if you are visible to oncoming traffic? Have you ever felt uncertain whether your fellow fire fighters are able to see you, particularly when there is no ambient light available?

Fhoss Technology is a company that is revolutionising the high visibility safety wear market and has developed a range of clothing which greatly enhances a fire fighter's visibility in all light and weather conditions.

The range of innovative safety products integrate powered light electroluminescence, which is combined with prismatic reflective tape with an illuminated core. This is then integrated to a range of high visibility garments that meets all required certifications and fire safety standards.

Specifically, the Fhoss Fi Harness, which sits over existing clothing, meets the FR EN469 and the ELECTRIC ARC F2621-2012 standard - making it an

ideal garment for fire fighters to wear in periods of total darkness and in all light conditions.

Andrew Kimitri, CEO of Fhoss International, comments: "Safety sits at the forefront of our agenda. While traditional PPE works well with the presence of ambient light, it is of no use in darkness or in bad weather conditions. Fhoss represents a big step forward in the PPE market as a whole, as it means that emergency services workers can be seen at all times and in all conditions. By introducing Fhoss to the PPE arena, we pledge to help bring about a change in culture for the way in which the emergency services protect their staff. We believe strongly that our technology has the capability to save lives.

"Finalists in three national awards in 2014, it has been a great year for Fhoss as we move towards our goal of making our powered safety wear common place on Britain's roads."

The full range of products can be found on the Fhoss website together with some great video clips showing the products in action.

For more information, go to www.fhoss.com



DQE Helps Prepare for Ebola Scenarios

Since the first laboratory-confirmed case of Ebola was diagnosed in the United States on September 30, 2014, healthcare and emergency responders have rushed to provide the proper protection to their staff. DQE has been there every step of the way to ensure that customers have the protection they need for infection control. Orders have been limited to healthcare and emergency response personnel only, so that those with the greatest need receive them first.

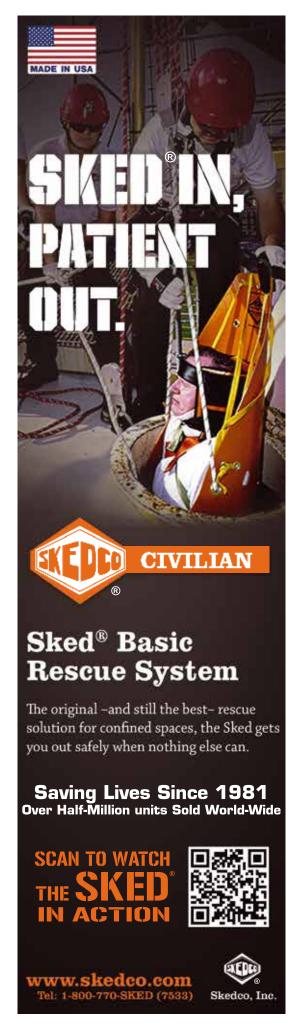
"The SafePaq blood and virus protection kit has been our best selling product for the past two weeks," says DQE president Tony Baumgartner. "We have been answering calls non-stop and helping our customers prepare for an infectious event. These are the types of events that we plan for and DQE is continually updating its supplies to support the evolving CDC standards." The SafePaq provides coveralls that meet ASTM F1670/F1671 Standards for blood and viral penetration resistance. Its contents provide a foundation of protection against a wide range of fluid and viral threats and have applications in healthcare settings as well as with emergency responders who may encounter a patient with an infectious disease.

"Another product we carry that has a significant application to waste management during an infectious outbreak is the Sani-Bag+," says Baumgartner. The Sani-Bag+ is used, removed, sealed, and disposed of without the caregiver having direct contact with the waste, therefore eliminating the possibility of cross contamination from infectious microbes.

By sending infection control supplies to support healthcare workers around the United States and the world, DQE is fulfilling its mission of being ready now for what's next.

For more information, go to www.dqeready.com/InfectionControl





World Rescue Challenge 2014 – A Great Success!

The World Rescue Challenge 2014 was hosted at the Fire Service College, Moreton in Marsh which proved to be a great venue with excellent facilities for such a multifaceted event.

Over 1400 visitors attended during the morning of the first day and the event went from strength to strength as teams competed on Friday 10th October through to Sunday 12th October 2014.

There were a number of challenges and workshops which teams participated in, from extrication, trauma, heavy goods vehicles and new vehicle technology.

The overall extrication competition was extremely close with first place only being decided on a count back of the results. This resulted in Hampshire Fire and Rescue







Service being crowned 2014 Extrication Team Champions with Carlow in second place and Valencia 1 in third.

The extrication trauma challenge was also very hotly contested with Humberside Fire and Rescue Service receiving top honours with Hampshire in second and the Luxemburg Red Cross taking third spot.

At the WRC Closing Ceremony on Sunday evening Jez Smith, Fire Service College managing director, handed over to Carlos Castro, councillor from Lisbon, who will be hosting the WRC in 2015.

Jez commented, "Congratulations to all the competitors - but particularly the two winning teams, both of which performed spectacularly. It was a fascinating event to watch and one that we were delighted to support. The World Rescue Challenge continues to go from strength to strength, as does the Fire Service College."

He added: "As one of the world's premier rescue training facilities, the Fire Service College is the ideal venue to stage such a large scale competition. Hosting the WRC also presented the College with a fantastic opportunity to open its doors to the public, to give them a chance to observe professional rescue teams in action."

A full list of the results from this year's challenge and details of forthcoming events can be found on the World Rescue Challenge website.

For more information, go to www.wrescue.org

Pointing the way to fire safety with Goodpoint

ire and Rescue Services in the UK are doing an amazing job of promoting the message that people should test their smoke alarms on a weekly basis. Ideas such as #testittuesday on Twitter ensure that this vital message is delivered in a unified and effective manner.

However, for many people, compliance with this message is also an invitation to put themselves in physical danger by getting onto chairs or stepladders in order to push the button. The resultant risk of falling simply prohibits large sections of the population from carrying out the task. Similarly, most of us are put off by the sheer inconvenience of doing the job! Be honest when did you last test yours?

Philip Martin, Area Manager responsable for Community Safety and Risk Reduction at Devon and Somerset Fire and Rescue, identified that the risk of injury was a barrier to the testing of smoke alarms and so designed a simple tool to make the task easier and safer. Philip said, "Sadly I have seen first-hand the tragic and needless loss of life in homes where smoke alarms were fitted but failed to operate when they were needed the most. It quickly became apparent that whilst the fire service was excellent at providing and helping fit smoke alarms, particularly in elderly people's homes, no provision was being made for a method of testing the smoke alarm safely on a regular basis."

Philip's simple idea became the Goodpoint smoke alarm tester and UK fire and rescue services are adopting it as part of their home safety visits, in increasing numbers. International interest is also gaining momentum with US fire departments taking up the product, an Australian distributor and enquiries from around the globe. The Goodpoint can be printed with both fire service details and safety message(s) which creates a highly visible reminder to test weekly. In short: this fun, eye catching, durable and cost-effective tool is fast becoming the medium of choice to deliver both the message and the means to safe test your smoke alarm weekly.

Statistics surrounding fire deaths

within the elderly population are shocking. Almost twice as many people over the age of 50 now die in dwelling fires in the UK each year compared to those under 50 (CFOA). Similarly, vulnerability such as experiencing mental health issues, drug or alcohol misuse, living alone or having limited mobility are seen as risk factors involved in fire deaths.

Another interesting angle is that the problem (in numerical terms) of smoke alarms that do not work is now greater than that of houses which do not have a smoke alarm at all. If we take the accepted statistic that 85% of UK households have a smoke alarm fitted we can see that approximately 3 million

homes crucially still need to get one. However, it is estimated that one in three of the smoke alarms that are fitted no longer work for one reason or another this is reflected in the dreadful figure that 28% of fire deaths occur in a dwelling where a smoke alarm was present but failed to work when required. The number of UK smoke alarms that currently do not work could therefore be close to 5 million!

To adopt Goodpoint as part of your community/home safety programme contact Ian McCord on +44 (0)1392 683397 or email ian@goodpointcampaign.com

For more information, go to www.goodpointcampaign.com



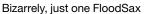
Crucial role for FloodSax on the emergency frontline

The sandless sandbags are so easy to store on the appliance yet can be used in so many ways at emergencies from soaking up leaking fuel from crashed vehicles to diverting floodwater away from homes and businesses and even as barriers against torrential floods.

hey have stopped tons of debris threatening to wreck homes in the aftermath of Hurricane Sandy in the USA in 2012 and in Scotland fire crews in the flood-risk town of Comrie see them as crucial with the River Ruchill often bursting its banks. They now have 2,000 FloodSax stored next to their station.

FloodSax have been endorsed by the National Disabled Fire Association as they are so easy to handle and deploy.

FloodSax are transformed from being as light as a pillowcase (700 grams) to become as tough and heavy as sandbags (20kg) within five minutes. They are vacuum-packed so take hardly any space to store and 20 fit into a cardboard box that one person can easily carry. Compare that to 20 sandbags that would need a pallet.





▲ The wall of Floodsax in the distance held back all this debris and the deluge of water that swept it there.



saved the day when an emergency centre faced being badly damaged by floodwater.

The FloodSax was a sample that had been given to the Georgetown County Emergency Management team in South Carolina - and when torrential rain started to leak under a doorway the sample was put there and immediately stemmed the flow.

Emergency Management director Sam Hodge said: "Within several minutes the FloodSax expanded to seal off the bottom of the door, literally keeping out gallons of water and saving water damage."

Emergency management expert Tim Shipman, who runs disaster recovery services for a company in the USA that

has nine major distribution centres and around 1,700 retail locations, now only uses FloodSax instead of sandbags.

He said: "FloodSax are very easy to use and are less labour intensive than trying to use the normal type of sandbag and much more effective and efficient when used properly."

And in the UK Mary Dhonau, chairwoman of the Flood Protection Association, says sandbags are hopelessly outdated.

"I hate them with a vengeance," she said. "They do nothing but filter water."

Floodsax have become vital for firefighters around the world.

For more information, go to www.floodsax.com

GOODPWINT

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Firefighters worldwid have used FloodSax when it counts ... in action

The pioneering sandless sandbags have soaked up fuel from crashed vehicles, diverted floodwater down drains and acted as barriers to save properties from countless thousands of pounds damage.

They are small to store yet as soon as they come into contact with water expand to become tougher and easier to stack than sandbags and powerful enough to stop tons of water and debris.

Please go to www.floodsax.com to see just how they work.







Video Fire Detection A New Affordable Solution

K Fire losses have substantially increased over recent years and are now regularly exceeding £1 Billion per year. Proposed budget cuts across the UK Fire Service will see large reductions in fire-fighter posts, appliances and the closure of Fire Stations. In light of these facts and proposed manpower reductions, earlier intervention of the emergency services to a developing fire has become ever more important. This will give the emergency services a better chance of limiting damage to buildings and more importantly saving both lives and jobs.

Spotfire together with their partners have produced a dual purpose CCTV Camera that can work alongside existing Fire Detection systems. Its inbuilt software will, in the camera's field of view, look for both the presence of smoke (indoor only) and flame (outdoor and indoor) as well as monitoring for any signs of criminal activity. Tests have shown that detection of smoke or flame takes place typically within 20 seconds. It can operate inside and

Spotfire Tomorrow's technology TODAY

outside of buildings and its operating system works in both daylight and night time conditions.

An indication of how unique this product is that, at this time, there are no European or International standards currently available. The USA, with both UL and FM, has created standards and the Chinese Standards body also has their own standard. The International Standards Organisation (ISO) produced a committee draft of a proposed standard, ISO/TC21/SC3 N813, which completed public comment on 13 June 2014. This proposed draft was rejected by several agencies including BSI as some of the test fires were deemed as inappropriate. A revised draft, ISO/DIS 7420-29, has been published for further discussion. This would indicate that the potential marketplace is now looking to legitimise this unique product, but if the standards procedures run to form we are looking at an industry wide standard not becoming available for several years

The duality of the Spotfire camera makes it an ideal solution for numerous locations. With arson attacks on Schools, Mosques and Business premises on the increase, the Spotfire camera has the ability to record such events as they happen. This true record of the events would be of interest to all parties, including property owners, the Police and Insurance companies. Areas at risk of fire due to their nature and storage of products would be Recycling Plants, Petro-Chemical Plants, Multi-Storey and Surface Car Parks, Warehouses, Distribution Centres and Airport Hangers. Public buildings such as Hospitals, Museums, Art Galleries, Libraries, Shopping Malls and Airport Terminals, particularly those with large atrium areas are prime candidates for this type of protection. The applications are numerous and its benefits are that by early detection it will minimise interruption to business and by association help to reduce insurance costs and claims.

It should be acknowledged that the siting of a camera or cameras will be dictated by a number of factors including the hazard involved, the field of view, the potential size and type of fire, obstructions to view and response time. The consequence of this is that a survey of the Spotfire camera potential locations should be undertaken by appointed competent installers prior to any installation, taking into account the above cited observations to ensure the correct maximum coverage. A huge plus for this equipment is its ability to be integrated into existing CCTV systems including CCTV security systems meeting the BS 5839 Pt1 statement as a complimentary item. For larger locations a standalone Spotfire system can be installed.

The conclusion that there are alternative means of fire detection available which can solve the impossible problem for consultants, installers and clients now has a proven case in the form of CCTV fire detection and in the foreseeable future will take its place alongside today's accepted means of fire detection.

For more information, go to www.spotfireltd.co.uk





A New, Revolutionary Fire Extinguishing Agent



upré Minerals' AVD (Aqueous Vermiculite Dispersion) is a revolutionary fire extinguishing agent designed for flammable metal fires, specifically Magnesium powder and Magnesium swarf. It offers significantly superior performance across the flammable metal range and has key benefits over existing solutions. Dupré have proven that AVD is more effective at extinguishing metal fires, especially Magnesium, than conventional extinguishing agents.

What is AVD?

AVD is an aqueous dispersion of chemically exfoliated Vermiculite. Vermiculite is the name given to a group of hydrated laminar aluminium-ironmagnesium silicates. Raw Vermiculite consists of thin, flat flakes containing



microscopic layers of water. When Vermiculite is exfoliated, either thermally or chemically, the microscopic layers of water are removed and this either causes expansion (thermally exfoliated) or creates microscopic, individual platelets that are freely suspended in water (chemically exfoliated). AVD is approximately 20% Vermiculite / 80% Water with a viscosity of 3000 cPs and a D90 of 180 microns (0.18mm). AVD is non flammable and has excellent insulation properties.

How does AVD work?

Due to the reactivity between a flammable metal fire and water, AVD is applied in the form of a 'mist' or 'foam'. The Vermiculite particles within the mist or foam are deposited on the surface of the burning fuel to create a film over the top of the fire. This film instantly dries and because the high aspect ratio platelet particles overlap and bind together, they produce a non flammable oxygen barrier between the fire and the atmosphere.

This process offers cooling to the surface of the fire and as the AVD platelets begin to build up they form an oxygen barrier over the fuel source, the fire is gradually cooled and brought under control. Unlike other Class D Extinguishing Agents where the fire has to be left for long periods of time before the fire is truly under control and completely burnt out, AVD offers quicker control to the fire.

What are the benefits of AVD?

AVD is suitable for both portable and fixed installations due to its fluid nature and a smaller volume of agent is required to extinguish the fire compared to conventional agents. The Vermiculite platelets within the AVD create a fire proof high insulation oxygen barrier that extinguish and not just suppress the metal fire whilst the water content cools the fire source.

AVD can be used in a Misted or Foamed format depending on the application and to date we have tested AVD in the following deployment systems:

- ✓ Portable Extinguisher Bottles
- ✓ Back Pack Extinguishers
- **Trolley Based Extinguishers**
- Fire Service Pump Systems
- ✓ Fixed Installation

In addition to its performance on metal fires AVD can also be used to extinguish Class A materials such as wood and plastic. The excellent re-ignition prevention properties of AVD provide a flame proof barrier to almost any substrate allowing the spread of fire to be contained.

For more information, go to www.avdfire.com





Flammable metal fires such as magnesium. can burn up to 3,000°C.



AVD is applied. The water content of AVD cools the fire source.



The Vermiculite platelets build a eramic type oxygen barrier on the fuel source stopping the fire and smoke/gas generation.



Further AVD particles fall on top of the solidified AVD crust, boiling off any water content and cooling the fuel source.



Introduction

TEISEN produced its first firefighting hose in 1903, and since then, it has been the most experienced and largest firefighting hose manufacturer in Japan.

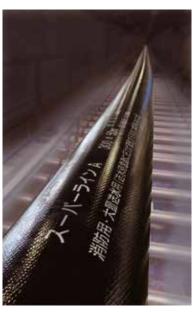
Super Line Large Diameter Hoses

TEISEN offers the Super Line LDH with a diameter of up to 300mm. Super Line LDH is manufactured using a one-piece construction method, extruding the cover and lining in one step, with polyurethane through a polyester jacket.

Features

- Minimized pressure loss
- Compact storage through a new kind of rubber-like, polyurethane material
- Available in long lengths
- •Excellent resistance to heat, fuel, chemicals, UV, ozone, weathering, etc.





Diameter	mm	100	150	200	250	300
	inch	4.0	6.0	8.0	10.0	12.0
Color		orange	orange	orange	black	black
Wall thickness	mm	3.5	3.5	4.0	4.6	5.0
Weight	kg/m	1.1	1.6	2.8	4.0	4.8
Burst pressure	MPa	4.2	4.4	3.6	3.0	2.8
Maximum working pressure	MPa	1.6	1.6	1.4	1.4	1.4
Temperature range	°C	-20℃~50℃				



7F-Yanagiya-Bild, 1-10, 2-chome, Nihonbashi, Chuo-ku, Tokyo 103-0027, Japan TEL: (81) 3-3281-3031 FAX: (81) 3-3274-6397

The World's only true multi-use helmet

LEADER Sar has been designed to meet the highest levels of protection combined with the highest possible levels of comfort and usability.

Lightweight and comfortable, the helmet offers a high level of impact protection which gives the wearer excellent protection from impact/shock both from above or from the sides.

The LEADER Sar all risks Helmet is suitable for many applications. It is tested to eleven different standards giving it the versatility to be used in a wide range of applications including:

■ Search and rescue / Confined Space / **CBRN** environments

- Water rescue / Swift Water / Marine / Ribs / Hovercraft
- Forestry fire fighting
- Ambulance / E.M.S
- Wildland fire fighting
- Maritime Rescue / Coastal Security
- Technical Rescue / Assistance
- Working at height / Urban Climbing
- All Terrain Vehicles
- Snowmobile /Jet-ski / Quad bike / Equestrian

It is available in many colours including; Hi-Viz yellow, Hi-Viz orange, white, red, black, royal-blue, olive green and navy blue as well as Police, Marine and Security colour options. It has a great range of accessories



including marine visor, forestry visor, integral eye shield and ear defenders.

For more information, go to www.leader-group.eu

Mahé Airport choose Kronenburg

The Airport Emergency Services of Seychelles International Airport on the island of Mahé in the Indian Ocean have received the first of two CT009 airport crash tender variants from Kronenburg BV in Holland.

This specific CT009 airport crash truck is based on a purpose built KME 6x6 airport crash tender chassis incorporating a 700 hp Caterpillar C18 diesel engine,

Twin Disc 6 speed automatic transmission and coil spring suspension.

The spacious crew safety cab has seating for a driver plus three additional crew members. The top hamper bodywork features four spacious lockers per side and innovative easy engine access. The integral tanks hold 12,000 litres of water and 1,440 litres of foam. It also carries 250 kg of additional media.

The remote roof mounted monitor has an output of 6.000 litres per minute (lpm) and the bumper turret 1,325 lpm. The Kronenburg CT009 is available with an extensive range of options; in 4x4, 6x6 and 8x8 wheel drive plus an air transportable 4x4 variant.

For more information, go to www.kronenburgfire.com



Image courtesy of Kronenburg BV

Continued Global **Growth For PBI**

BI Performance Products is enjoying continued growth across Europe as more fire and rescue services specify the company's outer fabrics as the preferred choice to protect their firefighters.

PBI fabrics are internationally renowned for their exceptional flame resistance and thermal protection from radiant heat, built on a 30-year heritage of technical excellence and innovation.

In Sweden, Gothenburg Fire and Rescue Service recently changed to PPE with a new outer fabric, manufactured by Viking, choosing Neo, which provides excellent tensile strength and tear resistance, along with the inherent protective properties of PBI fibre. Katarina Appelqvist, Gothenburg Fire and Rescue Service, said: "PBI is integral to our new PPE system which was chosen after a rigorous trial and evaluation process to ensure the best combination of protection and comfort for our firefighters."

In the UK, Manchester Fire and Rescue Service have also opted to protect their firefighters with PBI Matrix fabric in their new PPE ensemble, designed and manufactured by Bristol Uniforms. Steve McGuirk. County Fire Officer and Chief Executive, Manchester Fire and Rescue Service, said:

"Our focus is on providing the best possible protection for our firefighters and PBI fabric plays an important role in achieving that in our new PPE."

In the Netherlands, Rotterdam Fire Department's firefighters will be protected by PBI Matrix fabric, which combines the high performing heat and flame protection of PBI Gold with a durable matrix of high strength denier filaments to reduce wear and tear. The brigade's new PPE is manufactured by Texport. Jan Bosch, insert title, Rotterdam Fire Department said: "We are very happy with the new firefighting suit, which was chosen after a series of extremely challenging wearer trials and tests, during which the team praised the suit's comfort and performance."

PBI Matrix is also the preferred choice in Ireland, where Dublin Fire Brigade's firefighters will also benefit from the high

standards of protection delivered by the fabric, supplied by Hunter Apparel Solutions.

In procuring their new fire-fighting ensembles, all of these fire and rescue services undertook detailed and demanding evaluations, setting extremely high performance standards for the component fabrics, as well as the complete suits. In all of these tests and criteria, PBI fabrics exceeded the required standards.

Since the North American introduction of PBI Max in 2012, there has been huge success in PBI growth. With over 35,000 sets in the field, the comfort, protection and durability of PBI Max is unquestioned. Major metro city conversions include Phoenix, San Francisco, Philadelphia, Baltimore, Montreal, San Diego and many others.

Further new additions are Gemini XTL and Titan 1260 complementing the internationally renowned PBI Matrix and PBI Gold fabrics.

PBI fabrics are lightweight and strong and achieve a high standard of flame resistance. They will not become brittle, shrink or break open when exposed to flame and high temperatures. This also means that the integrity of the internal layers of the garment is protected and the transfer of any radiant heat is slower, allowing more time for firefighters to escape to safety in a situation such as a flashover.

The outer fabric is the first line of defence in any protective clothing ensemble and

has to be strong and durable to cope with the impacts and abrasions that come with the job. It doesn't matter how well a fabric protects the wearer if it won't hold up to the working environment. PBI fabrics are very durable with high tear and UV resistance. They have a proven track record of maintaining performance and protection levels throughout the lifetime of the garment and that high durability also helps to ensure low maintenance.

Helmut Zepf, Vice President, International Sales & Marketing, PBI Performance Products said: "The continued success and growth of the business across all of our markets is a result of the quality and performance of our products and the commitment of our team to work closely with fire and rescue services to fully understand their needs.

"The specialist knowledge and expertise that we have developed through close relationships with our fire service end users and supply chain partners over the last 30 years informs our continued innovation and product development.

PBI fabrics protect front line firefighters all over the world in Australia. New Zealand. Asia, the Middle East, North America and much of Europe, including Scandinavia and Germany.

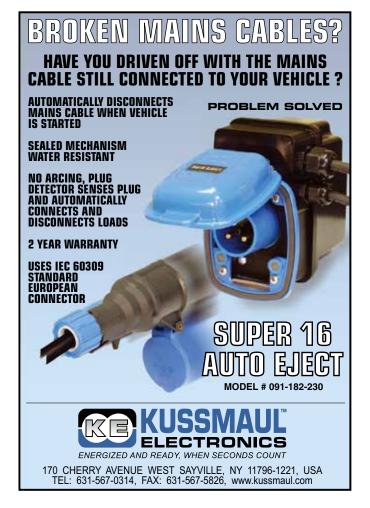
For more information, go to www.pbiproducts.com



Enhancing Situational Awareness with Advanced Thermal Imaging

As the world leading provider of advanced thermal imaging equipment to the fire industry, ISG prides itself on its unique ability to enhance the performance and operability of its thermal imager's well beyond their core and most basic function. Our cameras are well-known for providing firefighters with the ability to fully interpret a fire scene and make better, safer, tactical decisions

ISG employs one of the largest and most comprehensive engineering teams of any firefighting TIC manufacturer in the world. Based across two continents in three separate facilities, our exceptional in-house development team are able to create and develop product enhancements that





ensure our thermal imagers remain at the forefront of technological advancement.

We offer a wide range of thermal cameras to suit all budgets, in fact, ISG is the only camera manufacture to offer two different NFPA models, our E380n was the very first thermal camera to ever be NFPA certified and now our personal format camera the X380n is the newest.

ISG has invested huge resources in streamlining our internal processes so that any camera returned to us for repair or service is submitted to our internal Repair Centre within 30 minutes of arrival at the factory. Our expert engineers can then assess the returned camera and provide a diagnosis and proposed solution within a matter of hours so that we can respond quickly, and get your camera retuned to you within 48 hours.

One thing is guaranteed with every ISG product purchased: you'll be getting the most technologically advanced thermal imaging solution, designed specifically for your application in the most extreme environments, and you'll get total peace of mind and absolute support with our complete after-sale service throughout the life of your product.

If you are interested in becoming a distribution partner with ISG please contact us to discuss this further. information.

For more information, go to www.isgfire.com

FLIR Systems launches new AX8 Fixed-mount Temperature Sensor

FLIR Systems recently announced the launch of its new AX8 fixed-mount temperature sensor. Combining thermal and visible cameras along with FLIR's proprietary MSX® technology in a small, affordable package, the AX8 is easy to install in space-constrained areas for automated and uninterrupted condition monitoring of critical electrical and mechanical equipment.

Enabled by FLIR's ground-breaking Lepton® thermal imaging core, the AX8 provides early detection of temperaturerelated issues in electrical and mechanical equipment, guarding against unplanned outages, service interruptions, and equipment failure, The AX8 is the ideal temperature sensor for continuous condition monitoring and fire prevention without the need for periodic manual scans.

The AX8 thermal imager has 4,800 active temperature points per image, provides streaming temperature data over industry-standard interfaces (Ethernet/ IP and Modbus TCP) for easy analysis, has a built-in web interface, and includes a full suite of Analysis and Alarm functions that automatically send alerts when the AX8 detects elevated temperatures.

Measuring only 54 x 25 x 95 mm, the AX8 integrates easily into electrical installations or any manufacturing environment. The AX8's streaming thermal, visual, and MSX video is output in standard MJPEG, MPEG, H.264 formats, adding multipurpose image capabilities.

With all of these features in a compact form factor, the FLIR AX8 addresses the condition monitoring and safety needs for many environments, including:

- Process and manufacturing industries
- Data centers
- Energy generation and distribution
- Transportation and mass transit
- Storage facilities
- Refrigeration warehouses
- **Engine rooms**

"With the AX8, FLIR is continuing to find new and innovative uses for its

increasingly-more affordable thermal imaging technologies," said Andy Teich, FLIR's President and CEO. "The AX8 is another example of how our new Lepton core's revolutionary price, size, and low power consumption is creating a new product category and corresponding applications."

At a groundbreaking price of 995 USD, the AX8 will be available for global order and delivery in the fourth quarter of 2014.

For more information, go to www.flir.com/ax8





The push for clean PPE and Healthy Fire Fighters

n the past decades, firefighters have been glorified for their tough and dirty exteriors that demonstrate their heroic efforts to fight fires and save lives. Soot covered turn out gear often served as a badge of honor, illustrating how courageous these men and woman are in their day to day job.

Recent research, however, has suggested that the fire flames are not the only battles our fire fighters are fighting. One other unforeseen battle is cancer.

Combustion by-products are pollutants that firefighters are exposed to when encountering fires. These contaminants include benzene, formaldehyde and even asbestos, which are known or suspected to cause cancer. In 2013, the U.S. Fire Administration (USFA) and National Institute for Occupational Safety and Healthy (NIOSH) announced that their multi-year study of a group of 29,993 U.S. firefighters concluded that they are at higher risk of cancers of the digestive, oral, respiratory, and urinary systems when compared to the general population. Although many of these exposures are inevitable in this field, there are unnecessary exposures that can and should be eliminated to reduce the overall risk. One way to do this is through the proper washing and drying of personal protective equipment (PPE).

Turnout gear becomes heavily saturated with carcinogens after an encounter with fire. The contaminants are not only on the outside of the gear, they become embedded in the fibers of the material. Firefighters take extra precautions not to inhale harmful toxins during the line of duty, however, they overlook that these hazardous particles are left with them on their PPE to be absorbed through the skin or ingested.

Podab Inc., a commercial laundry manufacturer based in Sweden, has exclusively partnered with the organization 'Healthy Firefighters' to aid in the prevention of carcinogenic

exposures through proper washing, drying, and handling of contaminated gear. Stefan Magnusson, the founder of 'Healthy Firefighters' and a firefighter himself, has developed a method of disposing dirty PPE through properly extracting and containing it immediately after an exposure so that it can be washed and dried promptly upon arrival to the station. He emphasizes that for this procedure to be effective, washing and drying must be done with equipment that can clean and dry it quickly enough so that it can be reused again as soon as possible.

Stefan said, "The heavy duty turnout gear is absolutely essential to keep firefighters safe, however, it is important to realize that after attending an incident the PPE can also act as a potential danger. Soot and other particles can contaminate the garments, making them a health hazard for our firefighters. In order to prevent this contamination, PPE should be removed immediately after every operation and washed and dried in a timely manner."

Podab presents a complete range of washing and drying equipment that has been developed in cooperation with Healthy Firefighters. It has developed the FC20 Protective Gear Drying Cabinet specifically to dry turnout gear.

This cabinet was the first drying cabinet on the market with the unique ability to dry PPE from the inside and outside by directing hot air through its hangers, significantly cutting drying time.

The FC20 bears a crucial component to the decontamination of PPE. Fire stations across the globe will be more likely to wash their gear if they can have it dry and ready to re-use as soon as possible. Damp turnout gear can be just as dangerous as dirty gear. If gear isn't fully dried, the moisture left can turn into steam during a fire and subject the firefighter to burns. Any moisture left in the gear can also mold or mildew. The FC20 cabinet is equipped with humidity tracking system (HTS) that measures the level of humidity every second to determine exactly when textiles are dry, eliminating any risk of dampness.

These cabinets are a predominant feature in fire stations across Sweden. By spreading awareness about the importance of clean PPE, Podab and 'Healthy Firefighters' hope to aid in the prevention of cancer in our firefighters worldwide. Our mission is to help protect the men and women who protect us.

For more information, go to www.podab.com



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The new Dual-Air intake engine technology significantly improves overall cutting performance and meets all Air Quality Control standards at the same time.



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Tipped BULLET Chain® to cut the widest range of materials found at fireground and rescue scenes.



MULTI-CUT® H Series Rotary Rescue Saw

New H Series is engineered and powered to work harder and operate longer in the most extreme fire and rescue conditions anywhere. The new technology engine is available in three sizes: 74cc, 94cc and 119cc. The Cutters Edge Black Star and Black Diamond Blades offer long cutting life and high speed cutting of virtually all materials. The new **BULLET BLADE™** is available soon.

CE94 Concrete Cutting Rescue Chainsaw

A new technology 94cc engine and a new style Diamond chain cuts reinforced concrete up to 16-inches thick. Features a lighter weight power head and full-wrap handle for high performance concrete cutting in any position.

All Cutters Edge NEXT GENERATION TECHNOLOGY Fire Rescue Saws are available in fully-equipped Field Kits designed for Rescue Cutting anywhere.



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 - Highest Performance (MIL-F)
 - Lowest Aquatic Toxicity
 - No Bioaccumulation





3% ICAO B ICAO C **AFFF** 0.5% **Fluorine**

Environmentally Most Benign AFFFs, designed for 3% MIL-F and 3% ICAO B+C based on Dynax's C6 Fluorosurfactants (≥99% C6/ ≤1% C4), passed fire tests at UL (United States) and SP (Sweden).



There's No LNG In My District ... Think Again!

Liquefied Natural Gas (LNG) has been in use for many years. In the past it had been more common in Europe and Asia than in the USA but that is changing rapidly. Large LNG ships have been loading in Africa and unloading in other parts of the world.



Tom Guldner

Tom is a retired Lieutenant of the New York City Fire Department's Marine Division and is a Principal Member of the NFPA Technical Committee on Merchant Vessels. His company Marine Firefighting Inc. is involved in consulting and training mariners and land based firefighters in all aspects of marine fire fighting. Tom can be contacted at marinefires@aol.com or visit www.marinefirefighting.com.

or the past 15-years I have been training tug boat crews who escort large LNG ships into and out of ports throughout the USA and Mexico. This training not only dealt with understanding the properties and dangers of LNG but I was also training these tug boat crews to use the powerful firefighting equipment installed on their boats. In addition to that training I have also conducted full scale evaluation drills at LNG facilities. These drills included the facility personnel, the tug boat crews, and the LNG ship's crew.

I have written about LNG and the procedures used to mitigate small fires and emergencies dealing with this super cold product in the past and will not repeat it in its entirety here. However, I will repeat some of the information regarding the properties of LNG of which you should be aware.

Liquid Natural Gas is a colourless, odourless liquid that is natural gas in a liquid form. Previously, the world's major supplies of natural gas have not been available to areas remote from the gas wells, as the cost of shipping natural gas in its gaseous state was simply too expensive. Liquefying natural gas reduces its volume 600 times and, because of this reduction in volume, it became profitable to export natural gas in its liquid form.

LNG is formed by subjecting natural gas to extremely cold temperatures; at -260°F (-161°C) the gas becomes a liquid at atmospheric pressure. Liquids at these temperatures are considered cryogenic. The weight of LNG is also important. LNG weighs just 3.9 pounds (1.8 Kilograms) a gallon. This is important because the weight of a gallon of water is 8.3 pounds (3.8 Kilograms), which means that the

LNG will float on the surface when spilled onto the water. After regasification and warming the gas from LNG will become lighter than air, but until then it will remain at ground level where it may find a source of ignition. LNG is almost pure methane, and so when LNG vapour burns, there is generally no visible smoke.

In this article I want to discuss some recent news about the wide spread proliferation of LNG being used as a fuel in our society.

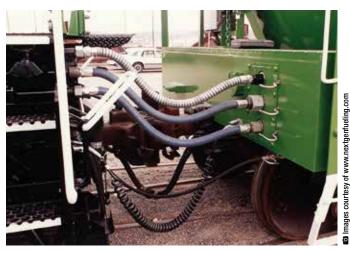
Fire Departments which have LNG marine transfer facilities located in their response areas have been (or should have been) well aware and well trained in the properties of this super cold liquid and the measures needed to mitigate a fire or emergency involving LNG. Hopefully you have worked and drilled with the facility personnel so that you will conduct a coordinated response.

Without coordination among the parties involved there can be no meaningful attempt to control a fire or emergency involving LNG.

But what if your Fire Department does not have an LNG export or import terminal in your port? Your Fire Department may not even be located on a coast nor have a port of any kind within your jurisdiction. You may feel that, because of this, you have no need of the knowledge nor the tools to fight an LNG fire or emergency.

Well, welcome to the 21st. century! For those of you who are located in or near a port, even if there has been no LNG presence in the past, you may have to deal with it now! LNG is no longer confined to massive cargo ships and land based tanks. Today you may find LNG almost anywhere. Recent discoveries of huge quantities of natural gas trapped





underground within deposits of shale have made LNG much cheaper and much more readily available than it has in the past.

Add to that the new environmental regulations soon to be put in place, which will make it extremely expensive to use petroleum based fuels, and you will understand why there is such a large proliferation of LNG used as a fuel not just in ships but in all forms of transportation.

Currently, in Europe, there are ferries and tug boats using LNG as their only fuel. There are plans for most new work boats and ships to be built to either exclusively use LNG to fuel that vessel or have some form of duel-fuel engine which can burn LNG or switch while underway to a petroleum based fuel.

So, even if your port does not have an LNG import or export terminal, you still may have to deal with the LNG aboard another vessel which is using your ports facilities. Also of importance to firefighters is where these new vessels will re-fuel their LNG tanks. Many ports are now planning or building LNG "bunkering" facilities to re-fuel LNG powered vessels.

Other ports are using LNG "bunkering" barges (Photo right) to use as a mobile refueling station. In some cases LNG tanker trucks will be used to re-fuel these vessels and other vessels will have portable LNG fuel tanks which can just be exchanged with full tanks when needed. Currently, a ferry and a tug boat in Norway are both fueled by tanker truck which drives out on the vessels dock to transfer the fuel.

OK, that accounts for the Fire Departments who are located on the coast or even on a commercial river. (I think that there are a few of those rivers in Europe and the USA!)

But, even if you are not located on or near any of those bodies of water you may still have to deal with LNG. Due to the previously mentioned fact that LNG will be more plentiful and thereby less expensive than it has been in the past, and also because it is considered a "clean fuel", it is being employed in more and more uses and modes of transportation everyday.

So, those of you who are located inland and no where near a body of water big enough for commercial shipping may

still find LNG powering something in your area. It could be a vehicle of some kind or just a piece of machinery that may now be powered by LNG.

There are LNG powered generators and pumps being put into use and there are or will be LNG powered busses, trucks, construction equipment, and locomotives1. (Photo of locomotive tender car hook-up above left)

"These railroads are considering the use of LNG in locomotives because of the potential for significant fuel cost savings and the resulting reductions in fuel operating costs. Given the expected price difference between LNG and diesel fuel, future fuel savings are expected to more than offset the approximately \$1 million incremental cost associated with an LNG locomotive and its tender."2.

These locomotives are being designed with LNG tanks built into the tender-car which follows the lead engine. Photo right shows the LNG controls located in the tender car.

Do you have any locomotives in, or passing through, your District? Then you will need to know what procedures will be needed to handle emergencies involving these LNG powered trains. Even if there are no trains in your district, you still need to read on.

Busses are already using LNG as a fuel in many areas of the world. Many bus and truck fleets will have their own re-fueling facilities at their fleeting locations. Personnel have been trained in the safe procedures needed in the LNG re-fueling process.

Many International Trucking companies are either switching to LNG as a fuel or they are adding more LNG fueled tractors to their truck fleet.3



courtesy of NLI Solutions



SAPHIRE COMPLETE TRAINING CONCEPTS



FLASHOVER UNIT - NOZZLE UNIT - EMISSION CONTROL - WOOD-FIRED TRAININGOBJECTS - GAS-FIRED TRAININGOBJECTS

CREATORS OF TRAINING HARDWARE

SAPHIRE is building up a global reputation as a valued developer and manufacturer of standard and XpertBuild training modules. One of SAPHIRE's unique characteristics is that it offers services to a range of industries including the world of fire-fighting, renewable energy industry and the offshore- and maritime industry. Visit our website to view our range of products and services.

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LNG liquefaction plants have been huge sites where massive LNG ships either deliver or pick up cargos of this super-cooled product. Some enterprising companies have developed a portable, modular LNG liquefaction plant that can be set up in remote areas. Some have even been placed in areas where they are actually drilling for the natural gas. As the gas is removed from the ground some is liquefied on site and used to fuel pumps and generators making the site self-sufficient.

National and International regulatory agencies have been attempting to keep up with new regulations and safety guidelines regarding both marine and land-based use of LNG as a fuel. These regulations should be understood and updates to safety bulletins should be reviewed to see if existing procedures need to be amended. For many Fire Departments this will be a new area of concern. In the past, Fire Department administrators have been criticized for re-acting rather than acting. Let's not wait until there is an emergency to train our Firefighters.

You will need to know what to do in fires and emergencies involving LNG. Many Fire Departments may have written guidelines for LNG in the past. It may be time to dustoff those guidelines or write new ones.

The National Fire Protection Administration (NFPA) offers valuable information as well as suggested rules and guidelines dealing with LNG. There are also many industry web-sites devoted to explaining LNG's safe handling and emergency procedures. One is the Center for Liquefied Natural Gas (CLNG). Their web-site is located at http:// www.lngfacts.org/

All of these modes of transportation will need to be re-fueled. Fleets of busses, long-haul trucks, construction equipment, government vehicle fleets will be looking for a local LNG gas station.

You will see more and more LNG re-fueling stations along your highways and in your cities. If you and your Firefighters are not current on your LNG training then you should get started now. The next vessel or vehicle fire you go to may have a placard like this one.



Will your Firefighters be ready? Until next time, stay safe.

In my previous article dealing with Fire Plans I inadvertently included bulkheads and doors as places where you would find the icon for a fire damper. Fire dampers, of course are found in air handling ducts. The closure for an opening in a bulkhead is called a FLAP and would be indicated by the icon below.



References

- 1 EIA projects that liquefied natural gas (LNG) will play an increasing role in powering freight locomotives in coming years. Continued growth in domestic natural gas production and substantially lower natural gas prices compared to crude oil prices could result in significant cost savings for locomotives that use LNG as a fuel source, according to EIA's Annual Energy Outlook 2014 AEO2014).
- 2 http://www.eia.gov/todayinenergy/detail. cfm?id=15831 Author Nicholas Chase
- 3 "UPS is adding even more natural gas vehicles to its existing fleet of 112 LNG tractors, augmenting recently announced plans for some 700 new LNG trucks with word that it would add 250 more..." Fleets and Fuels web-site - http:// www.fleetsandfuels.com/fuels/cng/2013/07/ ups-boosts-Ing-plans-adds-cng/











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AN INNOVATION FROM



Global Progress on PPE Standards

Delegates from around the globe helped to ensure that international standards for PPE took a significant step forward when they met in Sydney at the end of July.



Simon Burnett-Boothroyd

ore than 40 representatives from 12 countries and a further 30 observers were present for the International Organization for Standardization (ISO) TC 94 SC 14 meeting hosted by Standards Australia and the Australasian Fire and Emergency Service Authorities Council (AFAC).

During the intensive five-day meeting, a number of work programmes were either signed off or developed. One particularly exciting and substantial development was the decision to

create a new transport rescue incident (TRI) standard that would provide the benchmark for firefighter PPE clothing in any transport related environment.

After a number of hours of discussion and debate, the SC 14 committee agreed to move forward under the TRI banner. The programme, which had previously been discussed at an SC 14 meeting in Edmonton, Canada, will now be developed to include a number of key areas including clothing, gloves, helmets and boots.



Simon Burnett-Boothroyd is Sales and Innovation Executive at Hainsworth



The momentum gained in Sydney will not be allowed to slacken with a strict timetable in place to ensure that the TRI programme is ready to be advanced when SC 14 meets again in 12 months' time.

International (ISO) standards are becoming increasingly important as the world continues to shrink. Firefighters from around the world now routinely attend major disasters in other countries and continents, often facing very different firefighting environments to those they are perhaps used to at home. Indeed, this was brought home to delegates attending SC 14, who watched the tragedy of the Malaysian airliner shot down over the Ukraine while attending the conference. During August, firefighters from Australia were called to support the efforts of exhausted Canadian fire crews tackling large-scale wildfires in British Columbia.

The sense that the world is a much smaller place than it was even ten or twenty years ago is helping to drive the importance of ISO standards. The impressive attendance and wide range of countries at the SC 14 committee points to a realisation that the global firefighting community needs to work much more closely in order to ensure the best possible response to incidents. In time, this may mean a comprehensive set of ISO standards, but with territorial nuances to take proper account of varying firefighting environments.

Rather than lots of different standards depending on where you happen to be in the world, it is likely that we will move

ever more towards a harmonisation of standards with the end goal that wherever you are in the world, there is a standard, a vital term of reference.

The most exciting and heartening aspect of the recent SC 14 discussions was the appetite of the attending countries to engage in working together for the common good. There was a genuine sense that delegates understood the responsibility placed in them to educate and inform on a global level.

Meetings like SC 14 also provide the opportunity for leading manufacturers, such as Hainsworth, to monitor the latest trends in areas such as firefighting techniques and buying processes. One of the biggest changes we are seeing is the ever greater collaboration among fire services both in terms of sharing intelligence, supporting each other operationally and joining forces for purchasing their PPE.

While collaborative buying will increasingly become the norm, it is clear from various conversations that, longterm, value rather than short-term cost savings will be a key driver in the market. This is something Hainsworth and other leading manufacturers have argued for some time, namely that true value is to be found in quality products that are still performing as well as ever after several years. The industry preference would appear to be for highly engineered, innovative garments that last as long as possible, providing cost savings over the lifetime of the product.

Hainsworth was delighted to hear recently that the Country Fire Authority (CFA), which helps to protect over three million Victorians, is conducting trials of the company's wildland Eco-Dry Shield fabric, while Fire and Rescue New South Wales continues to provide its structural firefighters with Hainsworth Titan 1220.

This month's AFAC in Wellington will have provided Hainsworth and other companies operating in the industry with the opportunity to continue the discussion around harmonisation of standards, collaborative buying, cost vs product durability, current and future technologies and many other topical issues.

There should be complete compatibility between the work of companies such as Hainsworth and the various standards committees around the globe. Both should be about driving quality - in innovation and product design - and improving the survivability of firefighters wherever they are in the world, and whatever firefighting environment they face. While the technologies that are harnessed to develop today's PPE and the discussions that go on around the table of committees such as SC 14 may, at times, be highly complex, no one working in the industry should ever lose sight of the very simple brief given to all of us. That is to ensure that firefighters are able to return home safely to their loved ones at the end of every working day.

By playing its part on various standards committees in Europe and elsewhere in the world and by continuing to innovate and develop new fabric technologies, Hainsworth has, over the past 150 years, aimed to be a lot more than merely a manufacturer. Hainsworth, and a small number of other established companies, are operating in a very specialist sector; one in which we are talking about the difference between life and death on a daily, indeed hourly, basis.

It should never be a cold, transactional business but rather one in which all parties - firefighters, procurement officials, manufacturers, standards committees and others - work in partnership to ensure that our fire crews are afforded the greatest possible protection.

For more information, go to www.protectsyou.co.uk





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Airport firefighting – protection and training for unique hazards

They happen rarely, but when they do, air accidents at or near airports present rescuers and firefighters with particular challenges which are guite different from those met daily by structural firefighters.

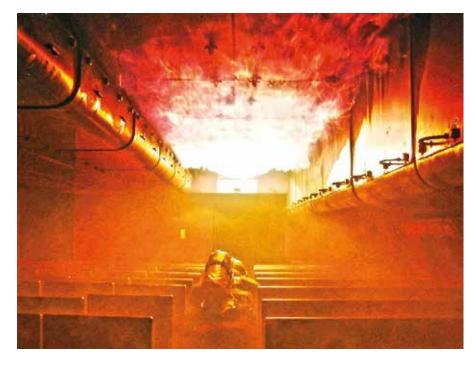


Paul Gibson

espite the media coverage given to mid-air aircraft accidents, such as the Malaysian Airlines' flight MH370 which disappeared over the Indian Ocean or MH17 which was shot down over Ukraine, such accidents are very rare but inevitably catastrophic.

Most aircraft accidents take place during take-off and landing and the level of a firefighter's skill and equipment can, and does, play a major part in minimising injuries and loss of life in such situations. Airport firefighters in many countries are specially trained in hot fire emergency response in which increasingly sophisticated specialist training rigs are used. Given the nature of hot fires and the risk of explosion when take-off, landing and runway collisions are involved, the type, and level, of protection provided to firefighters should be selected on its performance, confronted with the particular hazards associated with a range of aircraft fires.

In recent years, international airports in the advanced economies of the world have invested substantially in upgrading their capability and preparedness for major incidents. This has included both the quality and performance of firefighting equipment and the level of firefighter training. As our understanding of the nature and behaviour of fires increases, so has the level of effectiveness in dealing with rapid evacuation and fire suppression. Aircraft fires require a combination of emergency services skills and close collaboration between the fire and rescue teams and ambulance paramedics. Clearly the first priority of the firefighters is to minimise the impact of the fire whilst at the same time extricating the injured from fire in the cabin areas. For the ambulance crews their priority is to assist with the extrication and provide on-the-spot medical assistance to stabilise the injured before getting them to hospital. Rapid transit to hospital will be



Paul Gibson is International Sales Manager with Bristol Uniforms.





by ambulance but, on occasion, may also call on the services of local air ambulances to fly casualties needing specialist treatment to specific hospitals where these facilities are available.

Airport firefighters encounter a variety of emergencies which range from a full blown runway disaster to smaller incidents, such as wheel, brake and undercarriage fires, as well as incidents involving airport buildings or vehicle fires anywhere on an airport site. A burning aircraft is a hot fire and presents special dangers of ignited aviation fuel, other inflammable liquids and the possibility of explosion requiring special firefighting equipment, foam suppressants and special clothing and training. Airport fire incidents involving buildings or vehicles require skills and equipment similar to those used by municipal firefighters whose assistance would often be called upon to deal with such incidents.

Training and special firefighting skills

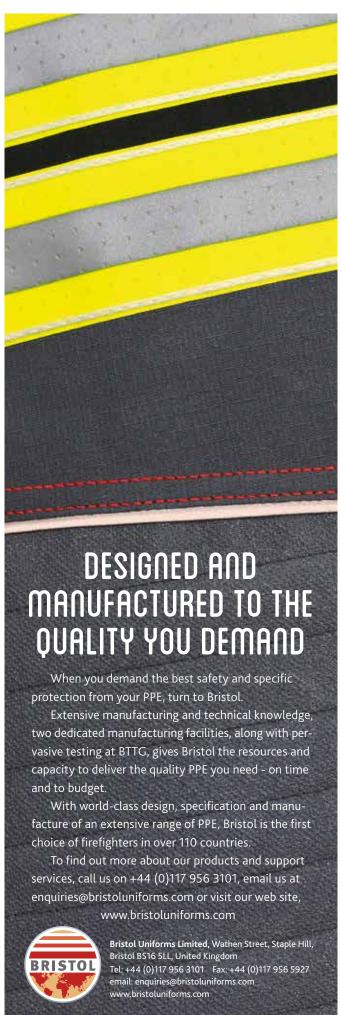
Firefighters spend many hours honing new skills such as rescue techniques and may be part of special teams, such as rapid intervention or rescue teams. By necessity, airports store large amounts of hazardous materials, such as aviation fuels, and other flammable products which can burn at extremely high temperatures. Some may react adversely to water so chemical suppressants are frequently deployed. Airport firefighters must also be aware of the environmental impact of the chemicals stored at airports and, in the event of a spill, must know how to properly contain and control those chemicals and require their PPE to provide penetration protection. They must also re-qualify every four years to be deemed competent partly due to the fact that they do not respond to as many incidents as municipal firefighters whose competency can normally be demonstrated by the number of calls they deal with annually. Many are also trained emergency medical technicians to render medical care and first aid.



Protecting firefighters across the world

Bristol is a major supplier of firefighter personal protective equipment (PPE) to airport fire services across the world as well as to around half the major airports in the UK, including Gatwick, Manchester and Birmingham. In Australia, Airservices is a government-owned organisation providing ARFF services at 22 of Australia's busiest airports. It responds to some 8000 aircraft and airport emergency assistance requests nationally (2010 figures). Their ARFF service is one of the world's largest providers of aviation rescue and firefighting services with more than 800 operational and support personnel based around Australia. Their 650 firefighters are equipped with Bristol PPE through a contract signed in 2010. Their largest ARFF stations are located at Melbourne, Sydney, Brisbane and Perth airports. Airservices Australia chief executive Greg Russell commented at the time, "This equipment is the very latest, we looked long and hard around the world to find the right equipment,"

In Europe, Bristol's kit is the protection of choice at European airports including Budapest, Oporto and Amsterdam Schiphol, a major intercontinental hub and Europe's fourth busiest airport handling over 52 million passengers in 2013. Michel Wendel, Business Controller Operations at Schiphol Group, explained that his firefighters are called upon to deal not only with aviation related incidents but many others in and around the Schiphol area which are more closely related to normal fire duty callouts. On average there are in the region of 50 aviation related precautionary standbys with several hundred other callouts for various fire and other related hazards during the year around the large Schiphol site. Although the airport only has one terminal building this is split into three large departure halls which serve the 6 runways which range in length from over 2km to 3.8km. The most recent runway to be built was completed in 2003 and there are already plans to



AIRPORT FIREFIGHTING



add a seventh in the near future. Schiphol is the world's lowest major airport being 3 metres below sea level.

At Schiphol training is carried out on a daily basis. There are 125 full time firefighters on station who all work shifts of 3 teams over 24 hours. The size of the airport complex is such that the firefighters operate out of 3 fire stations, Rijk, Sloten and Vijfhuizen which are located around the site. The Fire Manager explained, "Fire training is carried out at the main station, Sloten, on a daily basis. Firefighters are on rotational duty and their training

is undertaken when they are on main station duty. Normally, training sessions last about 4 hours. A range of training is carried out including simulated firefighting on a Boeing 747 test rig with a computer controlled gas fire".

Schiphol has a very good air traffic accident record. There has only been one major aircraft incident involving loss of life over the past 20 years. In February 2009, a Turkish Airlines flight from Istanbul crashed on approach. The plane carried 128 passengers and seven crew on board. Nine people were killed and a further 86



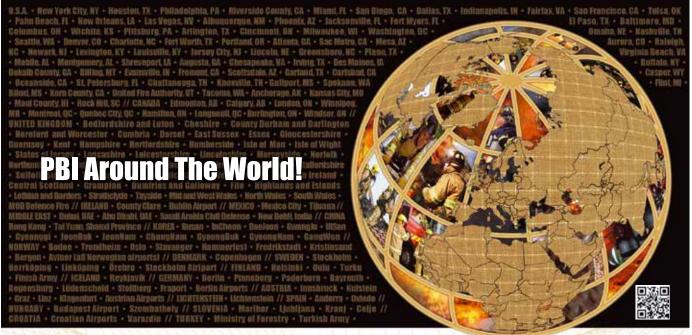
were injured, including six with serious injuries. The crash was attributed to a malfunction in a radio altimeter which failed to provide the correct height above the ground. A non-aviation related incident occurred in 2005 when fire broke out at the airport's detention centre, killing 11 people and injuring 15. The complex was holding 350 people at the time of the incident.

PPE selection

Most, if not all, airports use a selection procedure for purchasing firefighter PPE which routinely involves trialling samples of kit from several manufacturers. The alternatives are inspected and supplied to firefighters to carry out wearer trials. Selection is based on a number of criteria including wearer comfort, durability, price, sizing, availability of stock, and the provision of an efficient managed care service to ensure the cleanliness and protective integrity of the kit as well as its longevity. A garment construction able to meet the highest Level 2 performance rating to EN469:2005 is normally considered essential in Europe, whilst North American NFPA1971:2013 or other national standards apply elsewhere. A number of airport fire teams are being, or have been in recent years, re-equipped giving them the opportunity to take advantage of the new lighter weight designs being introduced to the market and which provide greater wearer comfort with reduced heat stress associated with prolonged periods of wear.

Richard Cranham, Bristol Uniforms' International Sales Manager, who is responsible for the company's supply contracts with airports across Europe and South America has witnessed considerable change in the specification and purchasing of PPE in recent years. He commented, "The operational demands placed on airport firefighters may vary considerably from site to site, but many rely on Bristol Uniforms' PPE to protect their firefighters. We have seen a steady move to replace traditional PPE designs with our XFlex™ lightweight jackets and trousers, introduced to the market in 2011, whilst also demonstrating a growing interest in adopting our integrated managed care services."

For more information, go to www.bristoluniforms.com



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Trends in High Volume Pumping

Trends in the fire industry are slow but persistent. When I started in this industry some 30 years ago, in the USA, a 1000 GPM (4000 LPM) pump was most popular. Over the years, this has risen to 1250 GPM (5000 LPM) and again to 1500 GPM (6000 LPM) pumps. This is a trend that continues to this day.



Michael C. Ruthy Chief Engineer, W.S. Darley and Co., Pump Division

hat drives this? Some of this is the nature of fire response. In the US, very few emergency responses require a truck to pump water at all, and certainly not at full capacity like this. Yet when they need to, they may need to give it all they have. This has led to larger and larger pumps. There are also incentives from insurance organizations that favor larger pumps. There are also bragging rights.

Clarence Saylor was a salesman for the now defunct New Lexington Fire Apparatus, and a good friend of mine and my company. I'd been to his plant in Rockwood, Pennsylvania, which is a small town of about 950 people. I recall we went out to lunch at a local diner because. in his words, "It's the only place in town that serves food." In their heyday, they

approached me wanting to build a pumper for his own department, and he wanted the highest flow possible. Local departments in his area had been playing

were probably building nearly 100 trucks per year. One day he

and everyone wanted to be championed as the best. Being a good colleague

this game for years,

of Clarence, I took on the challenge. We started with our N2000 model

and custom machined the impeller for maximum flow. I recall we got over 2300 GPM (8700 LPM) out of it, making it our highest maximum flow N series pump in our history. Clarence was ecstatic. But these are bragging rights, not practical points.

New Lexington was located in a largely rural area as were the surrounding communities. It is doubtful that they needed this large of a pump, or that they could supply it with enough water even if they did. That said, even small communities have some large structures,



Image courtesy of W.S. Darley & Co.

was employed by Hale Fire Pump Company in Conshohocken, Pennsylvania, before working for W.S. Darley & Co, in Chippewa Falls, Wisconsin, USA, in 1989, where he took the position of Chief Engineer in 1996. He has worked with over 100 companies internationally and is available at

mikeruthy@darley.com.

Michael C. Ruthy graduated from

Pennsylvania, USA in 1985 with

Lafayette College in Easton,

a Bachelor of Science degree

in Mechanical Engineering. He



▲ High volume fire boat for Melbourne Fire Brigade.

or various difficult to defend facilities such as petroleum storage tanks, that are going to require large amounts of water. While it is possible to make up for a large pump by tasking several smaller models on the fire, this can get unwieldy and difficult to coordinate. The number of hoses and connections make maneuvering difficult, and trucks can get caught in a single position, unable to move, even when conditions have changed, without disrupting the water flow for other pumps. Clearly, there is an advantage to having a single large pump in some circumstances.

Back when I started in the fire industry, a 2000 GPM (8,000 LPM) rating was the largest available. Even these were not terribly popular at the time, as you needed a truck with a very large engine in order to achieve such a rating. But as chassis power rose over the decades, this limitation was overcome. Currently, it is not unusual to see a chassis equipped with a 450 HP (335 KW) or even larger engines. That is good, since for some of the pumps on the market now, that is barely enough.

Pumps on the market now can exceed 3500 GPM (13,250 LPM). Many of these are at lower pressures, say 100 psi (8 bar) and need to be run from huge water mains to achieve these flows. This is not an issue with many large petroleum facilities, but could be a challenge in some municipal markets.

Another area that is embracing high volume pumping is the maritime industry. Many of our boat manufacturers are ordering very high volume pumps and reporting extraordinary results. In our testroom, we need to operate from a lift condition and are therefore limited to about 3500 GPM (13,250 LPM). These vessels operate with no lift requirements and achieve much higher reported flows. Our latest sale involves a 1000 HP (750 KW) engine. We look forward to seeing what this will do for performance. I'm expecting flows in excess of 4000 GPM (16,000 LPM) and for vessels, unlike industrial truck ratings, this would be at 150 psi (10 bar). They certainly have the power, unless they need to reserve a lot more than I think they will for propulsion and maneuvering. These vessels are being furnished by MetalCraft Marine out of Canada to Tacoma, Washington and will be used for firefighting, or that is their intended purpose. My cynical colleague, Kevin O'Sullivan, suggests that these are more likely to be used for photo opportunities and to impress the mayor. That said, there are a lot of structures and other large vessels in many harbors that could benefit from high volume pumping.

Another area we've entered that needs super high volumes is the petroleum (shale) fracturing industry. We don't supply the pumps that do the actual fracturing, but rather supply the pumps for water supply to feed those pumps. Although this isn't an actual fire fighting application, there are a lot of similarities, and a few dissimilarities. These fracking feed lines, as they are known, can be several miles long, perhaps up to 50 miles (80 KM). This requires staging several pumps in relay to complete the entire chain of pumps and hoses.

The location where our pumps eventually discharge is a bulk water storage facility near to the actual well location. Much like the fire industry, reliability is highly prized. Once fracking operations have commenced, they must be continued until completed or the well must be capped. Such a disruption carries an enormous expense. This daisy chain of pumps need to be able



to communicate with each other so that they can detect a disruption in the flow rate that requires some intervention. As noted, there is a short period of time to correct any complications. Our ability to coordinate communication between units, and to the command post, has also shown useful in military operations to move fuel over long distances, though the US military has not been interested in so high of flow rates. The experience we've gained in telemetrics and telematics may be useful in the future of firefighting, as vehicles can know the location of other vehicles and communicate operating status for smoother operations.

The high flow rates of the new pumps on the market require the builder or procurement officer to carefully consider the entire system. Is there truly a need for such high flow performance? How will it be fed and discharged? Is there sufficient power available for such operations? While a single high volume pump sports

many advantages, it also requires careful study on the front end.

While there are instances where high volume pumping is worthwhile, or even plainly needed, smaller pumps shouldn't be ruled out. The Red Rhino vehicles being produced in Singapore are a great example, where a small 500 GPM (2000 LPM) pump equipped with a compressed air foam system (CAFS) is being installed on a small, maneuverable vehicle for highly effective first attack. It is good to know that large volume pumps are now available, but it is not going to eliminate the need for smaller pumps.

One caveat to consider with high volume pumps is that they are not well suited to smaller flow rates. When a pump is designed for high flow rates, it should be operated at those rates. Using a 3000 GPM (12,000 LPM) pump to fight a 10 GPM dumpster fire is very hard on the pump, much harder than if a 500 GPM (2000 LPM) pump were being

▲ A Frac supply pump with 10" (25mm) suction and discharge flowing over 3500 GPM (13,250 LPM).

used for the same situation. Pumps work best when operated near their best efficiency point, and the further away from that one gets, the more trouble and wear there can be from operations, from flow vibration issues to overheating or cavitation damage.

Darley, and most other pump manufacturers, offer a wide variety of capacity and pressure ratings to suit many different applications - high volume pumping being just one.

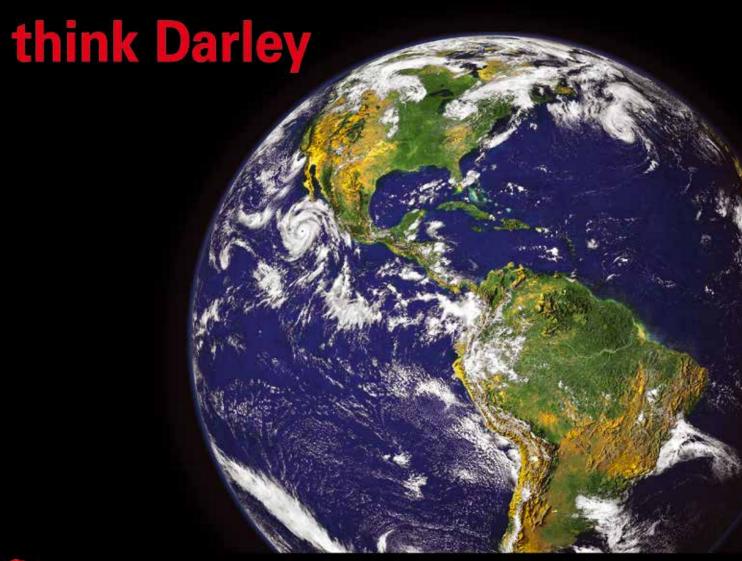
I think the days of Clarence Saylor saying that he just wants the highest capacity pump he can get are long gone - a lot more study is required to take it to this next level.

For more information, go to www.darley.com



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Russian Helicopters Airborne Fire Brigade

As skyscrapers increasingly dominate city skylines across the world, firefighters are being equipped with helicopters to fight blazes in built-up urban centres. In 2013 about 90,000 people died in fires across the world with the problem being most acute in wealthier, more developed countries.

n the USA, firefighters were called out to deal with almost 1.5 million fires in 2013, including 400,000 in residential areas. Twenty-three fires were categorised as particularly severe and were among the most destructive. Last year alone, more than 3,000 Americans died in fires.

It is not just in the USA - in China, according to official Public Security Ministry data, the first day of the New Year holiday week saw about 3,000 fires break out. Most were caused by fireworks, and cost the country's economy more than 7 million yuan (about £707K / US\$1.1M).

Also in 2013, the world's largest

country, Russia experienced over 153,000 fires in residential buildings which caused damage estimated at US\$400 million.

Skyscrapers blaze like matches

Modern urban centres are developing upwards. Skyscrapers of course define the cityscapes of New York, Toronto, Sao Paolo, Shanghai, Tokyo, Moscow and cities across the UAE. As they develop in this way, urban centres become increasingly dangerous. It is much harder to extinguish a fire in a heavily built-up high-rise area, as ground-based crews are markedly less effective. As a result,

even a small incident can quickly escalate into a major tragedy.

In early February 2011, two neighbouring sky-scrapers caught fire in Shenyang in north-east China. One was about 200 metres high with the other being 150 metres high.

Fire-fighters battled the blaze for six long hours but the buildings were totally gutted. In February 2009, the Mandarin Oriental Hotel in Beijing had just been opened. It was 159 metres high and burned like a match and there was precious little left to rebuild. About 90 people were poisoned



COMPANY PROFILE RUSSIAN HELICOPTERS



by smoke inhalation in a fire that broke out in a 35-storey building in the centre of Sao Paolo, Brazil, in January 2005.

Statistics indicate that about 70% of all fires worldwide break out in cities and helicopters are increasingly being looked to as an irreplaceable weapon in every firefighter's arsenal - both for putting out fires and for evacuating people.

In Moscow in spring 2012, it was helicopters that came to the rescue when a fire broke out on the 66th and 67th floors of Moscow City's "Vostok" tower which is Europe's tallest business centre. It was still under construction at the time and with 300 square metres engulfed in flames, strong winds made putting the fire out at that altitude almost impossible. People feared the building could be critically damaged in the inferno and that it might even collapse onto neighbouring buildings. It seemed doomed.

However, two helicopters - a Ka-32A11BC and a Mi-8MTV - came to the rescue. They weaved their way through the flames, which blazed seven metres high, to put out the fire and save the buildings. Darting back and forth between the towering inferno and a nearby river the Ka-32A11BC directed its horizontal fire-fighting water cannon at the windows, and the Mi-8MTV dumped tons of water onto the blaze, dousing the flames and saving the building.

The helicopters also proved their versatility in summer 2013 in Indonesia, fighting a massive forest fire on the island of Sumatra. A Russian Ka-32A11BC was also deployed as part of the international firefighting mission. The Ka-32A11BC has put out fires in Idaho (USA) and

Vancouver (Canada), leading American specialists to recognise it as the best in its class.

Firefighters' emblem

The Russian-made Ka-32A11BC is so successful at fighting fires that it has been adopted as the emblem of the Global Helicopter Firefighting Initiative (GHFI). João Velloso, CEO of Brazil's Helipark Taxi Aereo commented, "This helicopter boasts unique capabilities for its class, making it highly effective at achieving its goals. It is particularly known for its reliability and resilience. It has never let us down."

The Ka-32A11BC's coaxial rotors

mean it can be deployed in difficult environments, where traditional helicopters cannot operate due to the risk of damaging their tail rotors and potentially crashing. The Ka-32A11BC needs just one pilot, and is highly manoeuvrable in high winds - it can turn sideways or tail-first into the wind and small handing errors have no impact on its operation. It can carry loads of up to 5 tonnes on its external sling.

In Brazil it is used to build electricity transmission lines in the Amazon. It can operate for up to 32,000 hours and boasts low running costs. The Ka-32A11BC can be fitted with over 40 different kinds of firefighting equipment, from Bambi Bucket and Simplex systems to water cannon for horizontal firefighting.

In further testament to its success, this helicopter is currently in service in numerous countries around the world - Spain, Brazil, Azerbaijan, Canada, Indonesia, Japan, South Africa, Switzerland, Kazakhstan and Portugal. Several multirole Ka-32A11BC helicopters have also been bought by China and Republic of Korea has a fleet of 40.

To date. Russian Helicopters has produced about 140 such helicopters, half of which operate outside Russia.

For more information, go to www.russianhelicopters.aero





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Are You Ready for the Next Disaster?

This article aims to answer one simple question and that is, "How do I prepare my department or organisation to respond to the next natural disaster that will affect my country or community?"



David Dickson

asically your organisation needs to follow some accepted protocols beginning NOW, it needs to develop a capacity to respond that is appropriate and flexible NOW, you need to reach out to those organisations that you will need to support you NOW. Don't reinvent the wheel because you don't need to. Don't wait for the disaster to arrive to do these things because by then it will be too late.

Now, having answered the question that this article sets out to answer in only sixty nine words, it seems appropriate that I take this opportunity to expand on the advice offered and share the benefits of my experience in the development of local and national capability, preparing organisations for the day that disaster strikes. Whether you decide to read on or not, the essential fact is that you need to start NOW. Don't delay, start today.

For those readers who have decided to read on, there is good news and bad news. The good news is that there are many people and organisations

in your position that have gone though this process in the past and the result is that there is plenty of experience and advice. Consequently, there is a wonderful methodology that you can adapt and use for your own organisation and situation. We will look at this methodology shortly, but first the bad news.

The bad news is that the world is changing and changing fast, what worked in the past may not work in the future, you and your organisation faces new threats, new challenges but also may benefit from new opportunities. Those of us involved in developing emergency response are facing a kind of double jeopardy. On one hand, the world is still firmly in the grip of a global depression with the world economy now predicted to contract by 1.7%. There are profound inequalities of income, with approximately half the world's population living on less than 1% of its wealth. All these factors result in even more demand for humanitarian support, which in turn makes funding for any form of response development harder to obtain.

David Dickson is a Director of Civilience Limited. He was formerly the National Coordinator for the UK International Search & Rescue Team (UK-ISAR) and worked for the UK Government to develop a national urban search and rescue capability in the UK Fire and Rescue Service. He has worked within the United Nations and European Union Civil Protection (EUCP) mechanisms as well in the USA, China, Australia, Asia, the Middle East and Africa.



In direct contrast to increasingly limited resources, the disaster response community is facing unprecedented increases in demand for its services. The number of recorded disasters has doubled from approximately 200 to over 400 per year over the past two decades and in the past 18 years, 11,000 extreme events have claimed the lives of 600,000 people and cost 1.7 trillion dollars (US) across the globe.

Today, the global population is 6.8 billion and 80% of the world's most populous cities are situated in fault zones. By 2025, the global population will reach about 8 billion and the world will add another eight megacities to the current list of nineteen. Today, about 55% of the global population lives in rural areas and 45% in urban areas; by 2025 it will be 41% rural and 59% urban.

Therefore, we can see that factors such as increasing urbanisation of the planet, changes to our climate resulting in more extreme weather events coupled with an on-going financial crisis will make the development of credible and effective response to natural disasters much more challenging that it has in the past. However, those of us working within the emergency response field are, by nature, adaptable, resilient and flexible, we have to be in our daily work lives and we need to bring these qualities to the longer-term process of developing a response that is capable of dealing with the next disaster, whatever that may be.

To help us achieve, what might seem at first glance impossible, a number of organisations, mechanisms and tools have been developed to help guide and support emergency disaster managers and developers through the necessary steps. Some of these are global, some more regional in their approach and some are specific to a particular risk or hazard. All these support mechanisms and tools can be linked into one integrated methodology termed the "Preparedness Development Cycle (PDC)", allowing you as the manager to decide which tools, methodologies or supporting organisations are relevant for your organisation and can be used to help you navigate around the PDC.

The PDC has been developed from the five 'Priorities for Action' identified within the Hyogo Framework for Action (HFA). The HFA is a 10-year plan to make



the world safer from natural hazards. The UN General Assembly endorsed the HFA following the 2005 World Disaster Reduction Conference (www.unisdr.org).

Develop Governance & Management

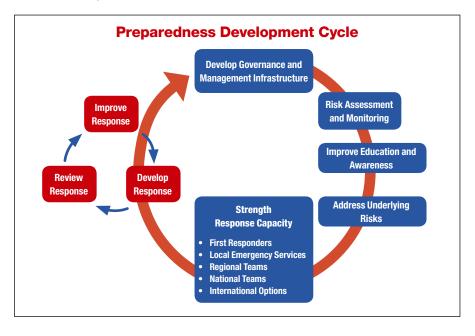
The cycle commences with the key task of developing a structure that will be responsible for disaster management and capability development, if one does not already exist. This entity, usually a state or regional government function, will need the legislative and financial powers to prepare and to respond. These organisations, your organisations, must capitalise on their relationship with government ministries to encourage the adoption and implementation of disaster plans, codes of practice, supporting legislation and guidelines. Once your management structure is in place, has a legal basis and is mandated and financed to prepare for disasters and to respond, you can move onto the next step.

Risk Assessment

The second step in the cycle and the starting point for reducing disaster risk and for developing an appropriate response lies in the knowledge of the hazards that the communities you are seeking to protect actually face. There is little point in educating, reducing risks and preparing to respond to a potential earthquake when the communities you are seeking to protect are subject to regular flooding. Once the hazards are known and the risks analysed then priorities for action can be determined.

Education & Awareness

The impact of disasters on communities can be substantially reduced if people are well informed and motivated towards a culture of disaster prevention and resilience, which is the next stage in the Preparedness Development Cycle. Disaster education requires the collection and dissemination of knowledge and information on hazards, vulnerabilities



DISASTER RESPONSE

and capacities. However, there is often a considerable time lag between major disasters and this makes building and sustaining awareness amongst the population particularly challenging. The International Federation of the Red Cross and Red Crescent Societies (IFRC) publish a useful guide for public education and public awareness for disaster risk reduction (www.ifrc.org) that suggests four approaches to increasing awareness of disaster risks across various stakeholders, namely:

- Campaigns
- Participatory Learning
- Informal Education
- Formal School-based Learning

At first glance, it may be questionable that a response organisation should spend time and resources on education and awareness. However, it has been shown that better educating the population about disasters both reduces the number of people actually requiring help following a disaster and increases the cooperation and goodwill towards the rescuers as they work within the disaster zone.

Address Underlying Risks

"Earthquakes don't kill people, buildings do," said Charles Richter, inventor of the Richter scale of earthquake magnitude measurement. It is well known that buildings, the objects within them and the infrastructure surrounding them are the major factors of death due to earthquakes. Similarly with other disasters, risks related to changing social, economic, environmental conditions and land use impact directly on the casualty numbers. As with education, time and resources employed by response organisations to address and reduce the underlying risks will result in fewer people trapped and injured, thus reducing the impact of the disaster on the responders and making the response more effective and sustainable.

One example of reducing underlying risks is the advocacy of national building codes by response organisations. National building codes exist in most countries, but the problems lie largely at the implementation level and so construction follows no regulations or standards. This is the reason that a large

earthquake in the developed world may barelydestroy any buildings, but a similar one in a developing country leads to large-scale collapse and loss of life.

Strengthen **Response Capability**

At times of disaster, impacts and losses can be substantially reduced if authorities, individuals and communities in hazard-prone areas are well-prepared and ready to act and are equipped for effective disaster response. This is the core responsibility for your organisation and there is a range of options available to you, ranging from the development of first responder networks, improving the capability of the local emergency services, up to the creation of specialist rescue/response teams. No single response option will meet all needs and the generally accepted principle is to develop a tiered response to any disaster or emergency.

Experiences in the past have shown that members of the affected communities play a critical role in rescuing and providing first aid to the injured and are far more effective in doing so than national and international teams that reach an affected community much later. Therefore, it is important that your disaster response has, as it's base tier, some form of first responder or citizen's response capability.

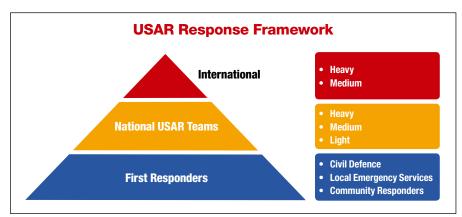
The International Search & Rescue Advisory Group (INSARAG) has developed some excellent guidance material focused around a diagrammatic representation of all levels of response. Termed the "USAR Response Framework", it starts with spontaneous community actions immediately following the disaster, which are supplemented initially by the local emergency services

and then by national rescue teams. Finally, there is the response of international USAR teams, supporting national rescue efforts. Each new level of response increases the rescue capability and overall capacity but has to integrate with and support the response already working at the disaster.

In order to ensure inter-operability between the levels of response, it is vital that working practices, technical language and information are common and shared across the whole response framework and this is a key task for your organisation. Great information and advice can be found within the INSARAG Guidelines (www.insarag.org) and the new Guidelines, being ratified in February 2015 will contain enhanced guidance supporting capacity building projects and response preparedness. The INSARAG Guidelines also contain useful advice and information regarding the final part of the Preparedness Development Cycle (PDC). This is the important process of reviewing and improving your disaster response capability, once it has been developed. Exercising, auditing, 'lessons learned' reports and peer review are all useful mechanisms for reviewing your capability but it is vital that these mechanisms actually result in improvements to your response capability.

In summary, when developing a response to natural disasters, it is important to follow a clear methodology such as the Preparedness Development Cycle and to use the vast amount of information, advice and experience available to your organisation. Learn from the mistakes of others and you will be ready for when disaster strikes.

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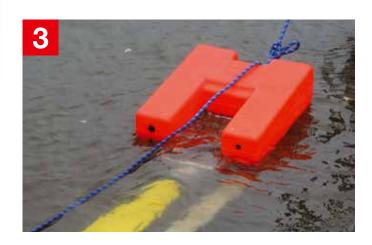
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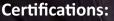
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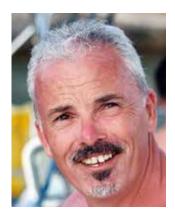
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Drugs and alcohol and what is it to the Fire Service?

How often have you been involved in a nasty incident when you suspect it was caused by a drunk or drugged driver? Have you ever had the same thought about a colleague when turning up for a shift? That's the bottom line, you need to trust your colleagues, surely it's implicit in the job, is it not?



Ean Lewin

Ean Lewin served his apprenticeship in Barrow working on nuclear submarines and then worked around the world in the oil industry and later the automotive market. With an Engineering degree and a Masters in Business, he saw an opportunity with the novel DrugWipe device. He formed D.Tec International Ltd in 1996 and performed the world's first Police drug driver screening trials in the UK during 1997/98. Dtec have implemented over 300 workplace drug testing systems in small local businesses, blue chip national companies and test around 90% of the London bus drivers. DrugWipe is currently with the Home Office for 'type approval' to start police roadside testing in March 2015.

want to discuss in more depth and in more modern times, the whole area of workplace drug and alcohol screening. Where the Corporate Manslaughter Act fits in for an employer and just what are the potential effects of the new drug driving amendments to the Road Traffic Act starting 2nd March 2015.

My experience of the UK Fire Service is from going up in a Snorkel when on a visit with the Boy Scouts in the 60's. Followed some years later by arriving at a RTC having seen the head on collision with a family trapped in one car so badly smashed none of the four doors would open, and a driver of the offending vehicle trapped behind the wheel of his own car. A freind and I set to, sending another driver to a house to phone for you guys, stopping the other traffic and trying to check passengers through smashed windows and blood, all alive

but barely conscious. Then it got worse, the families car caught on fire. Now we tried in vain to force open the front doors, then to extract them through the broken windows, only for the mother to tell us that their children were in the back - we hadn't seen them for the carnage - two tiny ones, trapped on the floor under the front seats. By now suffering minor burns and loss of body and facial hair, we were forced away to leave it all to burn. The only thing we could do was to push away the other car with the trapped driver who had caused it all, away from the inferno and await the Fire crew. Respect to you guys.

Since then, for my old job in the oil industry, I have been trained on several occasions in Singapore, Aberdeen and Norwich for fire-fighting and rescue in smoked chambers.

Nowadays, well away from the oil



DRUGS AND ALCOHOL

rigs, I am running a drug and alcohol screening business in the UK and Ireland, and in odd but unique position to understand the implications of all three main issues facing any manager. They are the changes in legislation, the new activities of the police and the implications on the workplace. This knowledge comes from having spent 18 years on constructing police drug driver law with government departments, advising senior police, civil servants and MP's including speech writing for the Lords and appearing in front of the Transport Select Committee. I also sat on the UK Legally Defensible Workplace Drug Screening Guidelines steering group and through my company, D. Tec International Ltd. have started the D&A screening for hundreds of local companies and national blue chip corporations.

The UK has a long list of well-proven legislation and regulations dealing with health and safety in the workplace, no doubt familiar in some degree to all managers and company directors in all organisations. The specific area we are concerned about here is the employee being in a fit state to work and not impaired or affected by alcohol, medicines or illegal drugs and other

stimulants. We could discuss the morals of consumption, but our key issue here is when it might affect their own safety, the safety of colleagues and the general public.

In another entirely different scenario, we also have the Road Traffic Act 1984 and subsequent revisions (RTA) - legislation familiar to us all in our personal lives with regards to drink driving and as always the moral argument of "Don't Drink and Drive." There is a general knowledge that in the UK "the limit" is 35 but most people have no understanding of what 35 is other than "it's about a couple of pints."

Going back to our workplace legislation, Health & Safety at Work etc. Act 1974 and revisions (H&S@WA), it says you must be in a fit state, to take care for your own and others safety, and importantly for managers, if you know or suspect a problem, you have to do something about it.

More recently and more of a concern should be the Corporate Manslaughter and Corporate Homicide Act 2007 (CM&CHA). With apologies to our legal brethren, this says "it is not enough to have a policy in place, rather, there must be operational systems and controls and an ability to prove they are being

applied." The consequences in the case of a fatality are that a judge may apportion blame, not to the company but to managers deemed responsible for the system failings. So personally, this could be a prison sentence and fines the magnitude of people's homes!

In 2014, the CM&CHA eventually showed some teeth with multiple prosecutions and note, the majority were backed up by failsafe H&S@WA prosecutions. There is no easy get out!

So let's switch back to the Road Traffic Act (RTA) which in its simplest form says, "do not drive if impaired" and this is through alcohol or drugs, or even through lack of sleep. This is RTA "Section 4" (Sec4) and remember the key point here is impaired through drink

The difficulty with Sec4 has always been the Officer proving to the court the subjective level of impairment of the driver, at the time of the incident. Hence, many decades ago, the RTA was amended to add a prosecution if simply "over a limit" of alcohol. This is RTA "Section 5" (Sec5) and levels are set in blood, urine and breath. This is the source of the number "35" familiar to all, the road side breathalyser limit. The important part here is that the screening









is from a breath sample and the evidential sample is blood or in the very near future, from breath on an "evidential" road side device!

We have all grown up with the shift from drinking and driving to not drinking and driving, either because of the morals of knowing you are factually "twice as likely to have an accident" at the legal level of alcohol, or from the effective deterrent of automatic loss of licence for 12 months or greater, plus fines and massive insurance hikes. In your roles, the visions similar to mine on that fateful day must reinforce that message?

Nowadays drugs are no weaker than years gone by, they are the same or stronger, and more readily available and taken in higher numbers. Please remember, people take drugs because it affects them, they wouldn't bother if they didn't! For a Police Officer at the road side (or a manager at the start of a shift), drug impairment can be more difficult to see and prove, yet with multiple drugs, or drugs taken with alcohol, impairment can be many times worse than alcohol alone. Only 10's of people are prosecuted each year for drug driving in the UK in sharp contrast to our 80,000 drink driver prosecutions, or even in contrast to the 35,000 drug drivers prosecuted annually in Germany. So the RTA is now amended with the addition of "a limit for a list of drugs and medicines" called "Section 5a" (Sec5a) and it will come in force in England and Wales on Monday 2nd March 2015.

The novelty of the new Sec5a is that it is in two parts, firstly, the list of illegal drugs will be at a Zero Tolerance

level and secondly, the list of impairing medicines will be at "above therapeutic dose" that will cause increased road risk, thus allowing for appropriately taken medication. For the RTA Sec5a, these drug levels will be screened at the roadside in saliva and then confirmed in blood.

Please remember that RTA Sec4 still exists. If you are impaired for whatever reason, you can be prosecuted with an automatic minimum of loss of license for 12 months.

So, where is the crossover for an organisation? Firstly you need to consider all risks in the job, not just the road. So if you are already Drug & Alcohol screening, you probably need to review your policy and systems, or if you are not screening, as a manager you need to look to sort it out for your own personal protection!

As far as the risks on the road are concerned, if the employee is driving for work, the road risk is the company's, but the liability of loss of license and possible subsequent loss of employment is the employee's. Presumably, as all employees are valuable assets to the organisation, there is a mutual and vested interest in being safe and legal. The employees should know better than to drink or drug drive, however make sure you can show a court that you advised them of this and you check it regularly.

The key point is that the RTA cannot be replicated in the workplace as an organisation cannot take the blood samples the police can, so direct comparison of results will never be possible. However it can be used as a lead. Organisations can, with the correct policy, take breath, saliva and urine samples for screening and confirmation. They can also use the same specification or similar quality screening devices to those of the police, and look to achieve or better those levels accepted as workplace best practice.

Drug and Alcohol screening seems a complex problem but working with an expert provides a simple, effective and secure solution.

Actions to take away

Policy: Have it in place and in practice. Have it reviewed regularly and by a specialist.

Educate: Impart knowledge as to dangers, personal responsibilities and consequences.

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Thermal Imaging Cameras - the Future of Firefighting?

The price and way we use thermal imaging technology is changing significantly. What does that mean for the firefighting industry, and how could these developments aid firefighters?



Rachel Hemsley

hermal imaging technology has been incorporated as an everyday tool for most fire fighters; the primary strength is the cameras ability to detect heat signatures - enabling fighters to locate individuals in extremely low visibility conditions (in darkness and smoke) and providing crucial insights for search and rescue of civilians, and potentially trapped team members.

Thermal imaging cameras can also be a help with the initial assessment of a scene, in terms of both understanding a building's structure and hotspots, which means the strategy for tackling the fire can be more informed. This can be especially helpful if the fire is isolated or hidden within the structure.

It's been well established that thermal imaging cameras are an essential for modern day firefighting because their use really can make a difference in saving a life. In the United States, the NIOSH (the National Institute for Occupational Safety and Health) Fire Fighter Fatality Investigation and Prevention Program, has repeatedly recommended the use of thermal imaging cameras as best practice. For example, after an investigation into a firefighter fatality in 2011, NOISH recommended that fire departments should use thermal imaging cameras during firefighting operations and has listed it as one of the items of minimum equipment that should be readily available to a rapid intervention crew.

Advantages of Thermal **Imaging Cameras Becoming Cheaper**

■ More Cameras

The steep price of thermal imaging technology has been a limitation of it becoming widely adopted in firefighting. However, this technology is becoming

cheaper and more readily available thermal imaging cameras can now even be bought as an add-on to an iPhone.

The image quality of the iPhone thermal imaging case is unlikely to be of a high enough calibre for use in this professional context, but this does represent a shift in the market, where thermal imaging technology can be bought for a few hundred instead of thousands.

Currently it's unlikely for every fire fighter to have thermal imaging equipment, it's generally shared amongst a team, but imagine the difference that could be made if every fire fighter had the information thermal imaging can provide, no matter where they were in the field - even it was at a lower resolution for the sake of being economical.

If each team member had a thermal imaging camera, not only could this speed up operations, but there could be a real time live feed to a central system monitored by another individual. This could add another pair of eyes with videos from various angles from the team members in the field, which could provide even more information about the scene to avoid dangers and create a more effective strategy.

■ Camera's with Better Usability

Thermal Imaging cameras' real strength is in the extra intel they can provide, which enables fire fighters to make more informed decisions. Part of the challenge of ensuring this technology gets used to the full extent is making it user friendly within an emergency environment.

This can come from simple adaptions of the technology; for instance, thermal imaging cameras within helmets are often preferred because of the hands-free functionality. If a thermal imaging camera can be adapted to a light simple iPhone case, surely it can be changed into other

Written by Rachel Hemsley on behalf of Instrument Sales and Services. rachel@foutainpartnership.co.uk



similarly convenient incarnations that might be of benefit to firefighters and emergency service individuals.

If it was standard issue for fight fighting equipment to come with a cheaper and integrated thermal imaging camera, more lives could be saved on a daily basis. Whilst projects like this may not seem like a revolutionary change to the technology, smart innovation in the usability of the tech has the potential to make a significant change in the outcomes of emergency scenarios.

Overall, simply more availability and use of thermal imaging technology may make the biggest difference when it comes to firefighting; technological advancements and lowering price tags could help this become a realistic option.

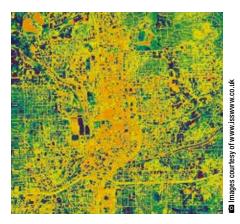
Innovative Developments of Thermal Imaging Technology for Fire Fighting

There are projects in several areas looking into this kind of development, and trying to assess how to best utilise thermal imaging technology to save lives and control fires.

■ Fire Detection and Prevention Sensors

Although a lot less funding goes towards fire prevention as opposed to fire containment, monitoring, early detection and prevention are the most effective tools in stopping a forest fire and limiting its damage. One device that is now being adopted in Santa Barbara in the USA (because of the areas high risk of forest fires), are known as "Flamesniffer" units.

They are placed on electrical poles within at risk areas and utilise infrared and thermal imaging for a mile in all directions to detect possible signs of fire. The cameras are only activated when their smoke detecting sensors are



triggered. The cameras then send images to the closest fire station. These units can withstand up to 485 °C temperature, so they can transmit helpful images for a considerable amount of time even if they get caught in the fire. They cost \$20,000 US dollars per unit; at that price it is unlikely this piece of technology will be widely adopted anytime soon in lower risk areas.

■ Aircraft's with Thermal Imaging

Colorado have recently invested \$20 million dollars in their own air fleet, two of these aircrafts feature thermal imaging technology and will be partially utilised to aid emergency services with forest fires. This technology is not new, it has been used in the military for over a decade, but it is the first time it's been purposely adopted for firefighting efforts in this way.

Having thermal imaging integrated into aircrafts offers two distinct advantages, they help with detecting the fire earlier, when time matters most. Part of the catalyst for this investment was the 2012 Waldo Canyon fire, where it took almost 6 days for the source of the smoke to be found by which point a vast amount of damage had already occurred. Theoretically this technology should enable pilots to fly over areas and quickly locate the source of smoke, hopefully meaning the fire is dealt with and contained more quickly, leading to less damage.

The other advantage this use of thermal imaging technology is that the planes are specifically made to withstand pretty much any condition, even flying through smoke, meaning they can easily provide crews with real time data of hotspots and the progression of the fire. This type of information is vital when trying to plan a successful firefighting strategy.

■ Scouting Robots that create a 3D Image of the Scene

Engineers from UC San Diego are currently developing a scouting robot that could become an indispensable tool for the future of firefighting. These robot scouts utilise thermal imaging, stereo RGB cameras and other sensors to provide fire fighters with a 3D scene of a burning building in real time. Also providing information about the state of the fire including sensing volatile gases, temperatures and structural integrity all while looking for survivors. The prototypes are Segway-esque devices which are autonomous, can climb stairs and can work collaboratively with other scouting robots to provide a full picture of the scene in a very short period of time.

If this technology was to become available to the public, affordable and widely utilised, it would undoubtedly help save lives, and if the protocol became for robot scouts to assess the scene it has the potential to significantly lower fatality rates of fire fighters.

Thermal Imaging technology has already aided firefighters in saving many lives, but it has the potential to help save so many more. With all the adaptions and developments of this technology it will likely become an even more integral tool for fire fighters in the future.

For more information, go to www.isswww.co.uk/thermal-cameras/





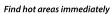
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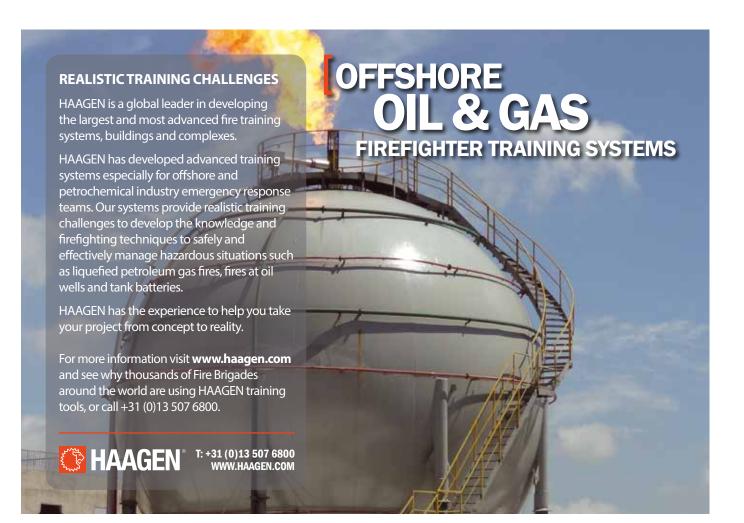




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Fire and Ice

We all know what a danger fire can be. But have you also considered what a danger ice can be? If your station is in an exposed area or on a steep incline, chances are you'll have to be on full alert the minute you step outside during the winter months.



Andrew Henry

inter in the UK is firmly here and brings with it the usual challenges - increased danger of slips and trips and restricted vehicle movements being just two dangers regularly faced by organisations throughout the UK. Fortunately the UK Highways Agency will grit major roads in a carefully planned priority system, though organising gritting on site falls under the remit of the organisation and can be an onerous additional task to coordinate.

It is often the case that roadways are clear enough to get to a place of work but the site itself can be icy, slippery or even under snow - leading to many logistical issues and often loss of business.

Fire stations and other emergency services are not immune from this problem and it is vital that these issues are addressed to ensure trouble-free ingress and egress at any point during the day, whatever the weather.

Clearly the emergency services have many tasks to perform - but predicting

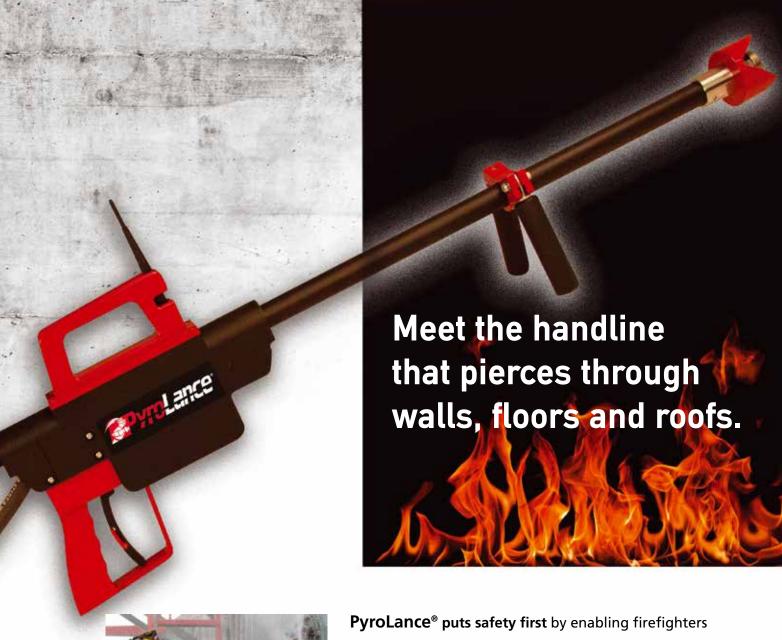
the weather ahead of a potentially cold snap and minimising the associated dangers come towards to bottom of a very large 'to-do' list - so it makes sense to consider utilising the services of a private gritting and snow clearing contractor who will monitor the weather and treat key areas before ice or snow form, mitigating risk and helping ensure uninterrupted service.

Awareness

In the UK, the Met Office works together with Public Health England to raise awareness and motivate people to take precautions during long periods of cold weather by providing cold weather alerts. These alerts are sent to all National Health Service Trusts throughout England as well as the general public through the Met Office website, public weather forecasts on radio and TV and also through social media. The alerts become active in November and end in March.



Andrew Henry is Sales Manager with Ice Watch Ltd.



to quickly penetrate, cool and control a fire before making entry. It's a lightweight, compact system that fits with any fire vehicle and uses only about 10% of the water of traditional fire lines.

Operations with the **PyroLance** system currently in place include **the United States Navy**, **the United States Air Force**, **the Panama Canal Authority**, **Dubai Port World Sokhna**, and others worldwide. See what it can do for your crew at **pyrolance.com**.





The Cold Weather Alert system has two clear trigger points:

- 1 When mean temperature remains below two degrees Celsius for 48 hours or longer.
- 2 When a region experiences heavy snow and/or widespread ice.

The trigger points have been developed in consultation with the Department of Health and the Health Protection Agency and only one of them needs to be breached in order for one of the following cold weather alerts to be issued:

- Level 1 (Green) Winter preparedness and long-term planning: This is the lowest state of alert during the winter months. At this level social and healthcare services will ensure that people are aware of and prepared for potential cold weather.
- Level 2 (Yellow) Alert and preparedness: Once the risk for any of the thresholds is above 60%, the Met Office will trigger a yellow alert. At this point social and healthcare services will ensure they are ready and prepared to act in order to reduce harm from prolonged periods of cold weather.
- Level 3 (Amber) Cold weather action: Amber alerts are issued as soon as any of the thresholds have been breached. Once in place, social and healthcare services will put in place specific actions to support those perceived to be at high-risk.
- Level 4 (Red) Emergency: This is the highest level of alert and is reached when cold weather is so severe and/or prolonged that its impact reaches beyond the health and social care system. It is issued on the advice of, or in collaboration with, the government and when health risks extend to the wider population.

Action

Reputable private gritting contractors work closely with the MET office and other private forecasting companies along these lines, operating a similar traffic light system of risk analysis to decide when gritting and/or snow clearing is to be undertaken.



- Level 1 (Green): Road Side Temperatures (RST) are forecast to be +2 °C or higher. It is unlikely that ice will form.
- Level 2 (Yellow): RSTs are forecast to be between +0.6 °C and +1.9 °C - there is a lower risk of frost, ice or snow but taken together with moisture and precipitation levels, this may trigger an alert and pre-emptive gritting.
- Level 3 (Amber): RSTs are forecast to be +0.5 °C or below (including dry roads below 0.0 °C) - there is still a risk of frost, ice or snow and depending on location and moisture levels, gritting often takes place.
- Level 4 (Red): Frost, ice and/or snow are forecast to occur. Immediate action is required.

It seems a simple formula, however, locations and microclimates must also be factored in. Microclimates are local atmospheric zones where the climate differs from the surrounding area. These zones can range in size from a few square feet to several square miles and are influenced by a number of contributing factors including:

Altitude

The higher you are above sea level, the colder the temperature will be. This occurs because the air is thinner at higher altitudes, thus it absorbs and retains less heat. The temperature usually



decreases by 1 degree Celsius for every 100 metres in altitude that you climb.

Distance from the Sea

As a result of oceans heating up and cooling much more slowly than land, coastal locations tend to be much cooler in the summer and warmer in the winter compared to inland locations at a similar latitude and altitude. For example, Glasgow is at similar latitude to Moscow, but experiences much milder winters as a result of being closer to the coast.

Prevailing Winds

The direction of prevailing winds can impact upon temperatures and weather conditions:

- Winds blowing off the sea will often bring rain to the coast and dry weather to inland areas.
- Winds blowing from warm inland areas, such as Africa, tend to be warm and dry.



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- Winds blowing from cooler inland areas, such as central Europe, will often be cooler and dry.
- The UK most frequently experiences south westerly winds from the Atlantic, bringing cool winds in the summer and mild winds in the winter.

Urban Climates

Urban climates refer to atmospheric conditions (temperature, humidity, wind speed/direction and air quality) in an urban area that differ from those in the surrounding rural environment. On average urban temperatures are between one and three degrees Celsius higher, but can be as much as 10 degrees Celsius higher than rural environments under calm and cloud-less conditions.

Hills and Mountains

- Anabatic/Upslope Winds: During the day, sun facing hills, mountain slopes and the air above them get heated faster than the adjacent atmosphere. As a result the density of the air decreases, causing it to rise. This causes more air to rise from below to replace it, producing wind.
- Katabatic/Gravity/Downslope Winds: In the evenings, as the highland loses heat, the air coming into contact with it also begins to cool. This causes it to become denser than the air around it and it therefore begins to flow downhill, generating a wind.

Gritting

One or more of these factors can have a direct impact upon local climates and therefore have an effect on the decision as to whether proactive gritting and/or snow clearing should take place.

Where weather forecasts and detailed climate analysis concur, gritting and/or snow clearing should be undertaken ideally at the optimum time from both a weather and site operations viewpoint. For example, gritting is most effective before ice forms but cannot be undertaken before all risk of rain has gone. If it is undertaken too early rain will wash away the salt used. The gritting contractor should be able to advise and treat the agreed areas within a narrow timeframe.

Site specific gritting and snow clearing plans should be agreed and in place well before the risk of bad weather - the plans should show the areas to be gritted, the type of equipment, the route, hazards and areas that snow is to be stacked in the event of snow clearing after a heavy snow fall. This should

be reviewed regularly during the course of the contract and also include matters such as entry and exit points to the site, security/ check-in arrangements and the issuing/ withdrawing of access cards. As well as the site plans, site-specific risk assessments and method statements should be in place for every site - most of this is a prerequisite for the £10 million Public Liability insurance that reputable private gritting contractors should have in place.

Unpredictable Winters Ahead

In recent years weather unpredictability in the UK has been very evident:

The winter of 2009/10 saw the UK experience its coldest winter for 30 years.

Weaker westerly winds also brought cold weather during the winter of 2010/11.

However 2013/14 was much more mild and stormy, resulting in the devastating floods that caused considerable disruption to many areas of the Country.

This unpredictability highlights the importance of being prepared for whatever the winters ahead may throw at us. Choose your winter risk management partner with care and discuss with them how best to be protected from the threat of ice and snow - so you can concentrate fully on the service you provide.

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Firefighting Foam – Making Water Wetter

As a largely misunderstood firefighting tactic, the use of foam has at times been confusing to the fire service. The result is that many municipal brigades/departments have just avoided the use of foam, especially Class A foam and have transitioned to using emulsifiers or wetting agents.



Dave Pelton

more important to fully understand the fit for purpose of each of these technologies. This assures that these valuable tools provide maximum benefit. Foam is a very effective firefighting tool for flame knockdown, fire control, extinguishment, and burn-back resistance (Class B foam). Control, extinguishing time, and burn-back resistance are paramount to the safety of firefighters everywhere. So where do we start? What is Foam? Firefighting foams

hile the end objective is to

stretch valuable and at times

limited water resources, it is

have been in commercial use since the early 1900's. The National Fire Protection Association in (NFPA) 11 - Standard for Low, Medium and High Expansion Foam, Section 3.1.10, defines foam as "a stable aggregation of bubbles of lower density than oil or water." Foam is made up by three component parts: foam concentrate + water + energy. Energy can take the form of air or mechanical agitation and when added to foam solution (foam concentrate mixed with the appropriate amount of water) finished foam is

produced through means of a discharge device. The finished foam is very fluid and readily flows over liquid surfaces to extinguish fire in four ways:

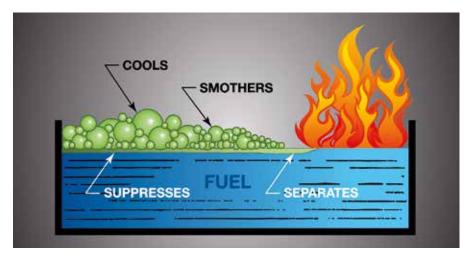
- Excludes Oxygen (separates fuel from vapor)
- Cools Fuel Surface (water content of foam)
- Prevents Release of Vapors (flammable fuel)
- Separates Flame from Fuel Surface

Class "B" Foam

While there are many different types of foam concentrates available on the market, the two most commonly used forms are Aqueous Film Forming Foam (AFFF) and Alcohol Resistant Aqueous Film Forming Foam (AR-AFFF), NFPA Standard 11, Section 3.3.12.1 defines AR-AFFF as "a concentrate used for fighting fires on water-soluble materials and other fuels destructive to regular AFFF or FFFP foams as well as for fires involving hydrocarbons."

Section 3.3.12.2 defines AFFF as "a concentrate based on fluorinated surfactants plus foam stabilizers to

Dave Pelton is Vice President, Global Marketing for The Solberg Company. Dave entered the fire protection industry in 1984 and has served on several trade association boards and industry technical committees on both a domestic and international level including Fire Equipment Manufacturers Association (FEMA), Fire Suppression Systems Association (FSSA), **National Fire Protection** Association (NFPA), and International Standards Organization (ISO).





produce a fluid aqueous film for suppressing hydrocarbon fuel vapors and usually diluted with water to a 1%, 3% or 6% solutions."

Each Class B foam concentrate is developed for a specific application. Some firefighting foams are thick and form a heavy, heat-resistant covering over a burning liquid surface. Other types of foams are thinner and spread much more quickly over the fuel surface. Still. other types of foams will generate a vapor sealing film on the surface of the fuel. Additional foam concentrate types, such as medium and high expansion foams, can be used in applications requiring large foam volumes to flood surfaces and fill cavities within a hazard.

Class "A" Foam

Developed in the mid-1980's Class A foam was predominately used for wild-land fires but as their popularity grew throughout the 1990's the use of Class A foam was expanded for use on structural fires.

Class A fires consist of ordinary combustible materials such as paper, cloth, wood, and plastics. These type fuels require the heat-absorbing effects of water (cooling) or water solutions. Class A fires consist of two types: flaming combustion involving gases which result from the thermal decomposition of the fuel. The second type is deep-seated or

glowing combustion. This type represents combustion within the mass of the fuel and has a slow rate of heat loss and a slow rate of reaction between oxygen and fuel.

As a synthetic based foam concentrate, Class A foam is applied at low concentrations ranging from 0.1% to 1.0% (see proportioning rates below). Cooling and wetting are the primary extinguishing mechanisms. The use of Class A foam makes "water wetter" on average increasing the effectiveness of water tenfold.

Typical Class "A" Foam **Proportioning Rates**

■ Exposure Protection: 1.0%

Fire Brake: 0.75%

Initial Suppression or Fire Lines: 0.5%

Overhaul: 0.25%

These proportioning rates make the use of Class A foam a cost effective means of combating fires because smaller amounts of foam concentrate can be used to make effective foam. Class A foam is biodegradable and non-toxic, so it is environmentally sustainable. Class A foam is deployed through a variety of portable and fixed appliance devices ranging from firefighters' backpacks, brush and fire apparatus, to rotary and fixed wing aircraft.

Using Foam Increases Operational Efficiency

Many rural and small urban fire brigades have already embraced the use of Class A foam as part of their everyday operational tactics. Their use of Class A foam, quite simply, makes good sense for them. For any brigade that has to bring their water to the scene with them and has to establish water tanker shuttles. using Class A foam can easily increase operational efficiency of fighting the fire. The reason for this is that, Class A foam, when properly deployed, allows the fire to be extinguished more quickly and with far less water than would be required if it were not being used. On average, the use of Class A foam increases water's wetting capability 10 fold. In more simplified terms... "making water wetter." In addition, the amount of time required post extinguishment during overhaul or mop up is greatly reduced.

"The use of firefighting foam by the fire service is not a single extinguishing solution, rather a tool (amongst many tools) that when combined with tactics create a more efficient operational scenario.

With the introduction of CAFS some brigades have taken the approach believing they could reduce water consumption (lpm) but the reality is whether using CAFS or traditional foam application appliances like line eductors or foam nozzles, water is still needed to suppress fire.

The use of foam, like other resources available to the fire service, is a force multiplier that when employed with traditional tactics stabilizes the fire hazard thus allowing fire personnel to enter the structure for overhaul. While there are efficiencies associated with the use of foam be it advancements in system hardware technology or the foam concentrate itself, the use of firefighting foam and Class A foam in particular is an asset the fire service should not overlook for structural protection.

One area frequently overlooked for the use of Class A foam is zero lot line properties or multi-family dwellings where the likelihood of multiple exposure fire scenarios is high. The ability to use foam for both internal and external exposure protection and simultaneous active fire suppression is an extremely valuable



CRITERIA	UL Requirements NFPA 18	UL 162 Requirements NFPA 11	NOTES
	Class A Wetting Agent (GOHR)	Class B Foam Liquid Concentrate (GFGV) [also suitable for Class A use]	Not comparable agents as indicated by separate listing and test criteria
Fire Test	1.5" depth n-heptane floated on water 50 sq. ft. (4.65m2) 1 minute pre-burn	2.0" depth n-heptane floated on water 50 sq. ft. (4.65m2) 1 minute pre-burn	55 US Gallons (208 liters) fuel on each test
Application Rate	0.2 gpm ft2 (10 gpm nozzle) (8.15L/ min/m2)	0.04 gpm ft2 (2 gpm nozzle) (1.63L/min/m2)	Application rate for wetting agent test is 5 times higher with less fuel
Extinction Time	No time limit – pan must not overflow before extinction	3 minutes or less for full extinguishment	Unlimited dilution (emulsion) of foam providing pan does not overflow
Water Type Used for Test	Fresh water only (no salt water test)	Fresh water and salt water test performed	Wetting agent (emulsifiers) perform much better with fresh water compared to salt water
Vapor Seal Tests	NONE	2 seal tests conducted during 9 minute waiting period	
Burn-back Test	NONE	Foam blanket must resist breakdown from flame for 5 minutes after foam blanket has rested for 9 minutes post fire extinguishment	Critical for post fire security
Polar Solvent Fuel Test	NONE	AR type foam tested for use on alcohols and other polar solvent fuels	Fuel containing greater than 10% Ethanol considered polar solvent fuels. AR type foam for extinguishment

resource for those in the fire service. Another advantage in using Class A foam is that lower nozzle flow rates are capable of being used. Fire flow rates can easily be reduced by half or more when Class A foam is deployed.

Wetting Agents and Emulsifiers – Alternative Products?

The use of firefighting wetting (mid 1960's) and emulsifying (early 1990's) agents were introduced to the firefighting community claiming use on Class A and B fires. The goal of these alternative agents is similar to foam agents in that they aim to reduce the surface tension of water. However, instead of forming a "foam blanket" on a Class B fuel surface, the solution is "vigorously" mixed with the fuel to form a non- flammable emulsion. Emulsifiers have limited foaming capabilities. Emulsifiers must be mixed with water at a given percentage and "forcefully applied" onto the entire surface of the burning fuel source. The resulting solution then mixes with the fuel, breaking it into very small droplets (the definition of an emulsifier). These droplets of fuel are surrounded or encapsulated by the emulsifier/water mixture to extinguish the fire.

The Underwriters Laboratories Inc. (UL) Directory defines wetting agents as "liquid concentrates which, when added to plain water in proper quantities, materially reduce the surface tension of plain water and increases its penetration and spreading ability." Water to which a wetting agent has been added to is sometimes referred to as "wet water" because of its increased ability to wet surfaces it is applied to. Wetting agents improve the efficiency of water in extinguishing Class A fuel fires. Use on Class B combustibles require much higher application rates than those requiring foam agents and is limited to non-water soluble flammable liquids (hydrocarbons only). Little if any burn-back resistance is present on Class B fires extinguished with "emulsifiers or wetting agents."

The NFPA Glossary of Terms defins an emulsifier as "a chemical or mixture of chemicals that along with some energy input promotes the formation of an emulsion." Use of emulsifiers or wetting agents does not afford use as a "fire brake or passive structural protection" (i.e. exposure protection). In contract to Class A foam the use of wetting agents and emulsifiers does not provide adequate exposure protection again radiant heat or an advancing fire. A note of caution here that Class A foam, wetting agents or emulsifiers should never be used on Class E (energized electrical) Class D (combustable metals), or Class F (cookin goils) fires as the water

content in these products is not compatable with the fuel hazard.

Shown above is the UL test performance criteria for wetting agents. It should be noted that there are distinct differences in the criteria for wetting agents vs. foams. All to often questions arise from not only the the fire service but industrial fire brigades, engineering firms and consultants as to "how does foam and wetting agents compare to one another." There certainly is an argument that both are firefighting agents in much the same way that apples and pears are both fruits, but that's where it ends. Ultimately selection of any firefighting tool should be governed by product(s) being "fit for purpose" and having the appropriate third party certifications for the intended application.

In conclusion, the use of Class A foam just makes smart sense. It enhances a fire brigade's ability to suppress fires more rapidly - improves water's wetting capability thereby providing faster penetration and greater fire control, increases protection of personnel and maximizes operational efficiency through the use of variable proportioning rates thus minimizing post fire clean up time, and conserving valuable water resources.

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New State of the art Fire Behaviour training centre

The Devon & Somerset Fire & Rescue Service (DSFRS) Academy's Fire Behaviour School is based at Exeter International Airport, UK and in summer 2013 a new state of the art Fire Behaviour training facility was constructed.



Jessica King

he Fire Behaviour School is a BTEC accredited live fire training provider, that specialises in delivering breathing apparatus (BA), compartment firefighting and positive pressure ventilation training. The school trains in excess of 2,000 operational staff within the service as well as instructors from 43 UK and international fire authorities.

The £3.35 million training site provides facilities for fire behaviour, hot fire and foam training. The building includes mock-up houses and an aeroplane to practice specialist firefighting techniques using life-like scenarios.

The Fire Behaviour School was established in 1997 and already had a base at the airport. Due to the practical nature of the training, the space needed and the generation of smoke on a daily basis, the airport site was the ideal location. The new building houses everything that is expected from a modern fire and rescue training

establishment including lecture rooms, an incident command suite, dining rooms, changing and shower rooms, drying rooms, BA servicing areas and storage areas. In addition to the main building, the site includes a three storey multi compartment structure for hot fire training, a large concrete training pad with various diverter valves for different classes of foam training, a cold BA training complex, attack containers and fire behaviour demo containers. The site is also a base for Academy office staff as well as the Fire Behaviour School instructors.

The addition of the hot multi compartment structure has resulted in a more versatile training facility. It is built over three floors and has rising main. The protected stairwell at one end can be used to simulate high rise incidents. There are 14 positions to burn crib fires. spread over all three levels. There are two stair cases and each level has access to fresh air virtually all round. The building



Jessica King is Academy Commercial Support Manager at Devon and Somerset Fire and Rescue Service.

TRAINING FACILITIES PROFILE





is fitted with an extraction system and temperature monitoring is throughout. The new structure provides the Academy with a number of options to have realistic live fire training, ranging from domestic property to industrial high rise. The Fire Behaviour School worked closely with the supplier Kenex Engineering throughout the building project and Kenex was able to respond to the specific requirements of the school to ensure that the building had a multi-functional use. Ian Bartlett, Station Manager at the Fire Behaviour School said: "Kenex Engineering were very responsive to our needs and involved us from the design stage right through to the commissioning of the building. They have provided us with a fantastic building that fits our needs perfectly. They also provide a very professional aftercare service that ensures that the multi-compartment structure is inspected and maintained

regularly to ensure it operates safely and within tightening budgets".

The Academy also worked closely with Exeter International Airport to develop a training centre that accommodates everyone's needs. A large (5525 sq m) training slab was included in the build and in the near future this will include an aircraft simulator with the possibility of a similar helicopter version. Like many other services, DSFRS have struggled to find ways to practice and train with foam. The Academy is now able to contain the foam and with the use of diverter valves can keep different classes separate so that the waste product can be safely disposed of when the training is over.

The site position is very favourable for commercial customers; there is easy access from the M5, A30 and A38. Exeter Airport is a growing regional airport with regular flights to many UK destinations as well as most of Europe. Plenty of accommodation is available close to the site, which makes it very convenient for national and international customers to attend courses.

In July this year, the Fire Behaviour School was visited by His Royal Highness the Prince of Wales and the Duchess of Cornwall to officially thank all those involved for the excellent work carried out by Devon & Somerset Fire & Rescue Service, as well as other emergency services organisations during the winter weather response. Andy Newland is the Academy Manager, he said: "It was an honour to host the visit by their Royal

Highnesses to our Academy site here at Exeter Airport on behalf of the local Blue Light services and Local Resilience Forum, we were blessed with great weather which was at the opposite scale to the winter storms, the reason why we were gathered together. Their Royal Highnesses met with representatives from responders and those supporting operations during the operationally challenging times from last winter and early spring. Their thanks to crews were appreciated by all present and we were grateful for them taking the time out with us while visiting the West Country. Before leaving us, the Royal couple observed a realistic joint agency response exercise using our training facilities on site and I know they were impressed with both the facilities and those taking part."

The Academy's Command School is also based at the airport site and recently RescueSim simulators have been installed for Incident Command training. The simulators were delivered and installed at the Academy by developer VSTEP. The addition of RescueSim will allow incident command trainers to produce fully immersive scenarios based on their operational requirements. Joe Hassell, Station Manager at the Academy said: "Being a large, rural fire and rescue service has presented our training staff with real challenges when it comes to providing our Incident Commanders with challenging and realistic training. Firefighter and public safety is Devon & Somerset Fire & Rescue Service's number one priority, and we believe RescueSim will assist us in achieving this aim. We are delighted to have signed a contract with VSTEP and have found their staff and trainers to be highly skilled, professional and attentive to our needs. We have started piloting RescueSim with our staff, with excellent feedback and look forward to developing our ICS training for all levels of command in the future". The Academy are using the UK version of the RescueSim Simulator, which includes realistic UK Police, Ambulance and Highways Agency vehicles, appliances and personnel for realistic training of incidents.

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Rotterdam-Rijnmond Fire Brigade chooses TEXPORT

At the end of 2013, the product quality that TEXPORT® delivers won over yet another prestigious client in Europe: the Rotterdam-Rijnmond Fire Brigade (Rotterdam urban region).

he toughest challenges in the tendering phase were seeing whether the suits could survive the extreme tests and vast range of mission specifications they would need to satisfy in practice.

In 2013, the Fire Brigades in the urban region around Rotterdam invited tenders for new personal protective clothing. Decisions within the tender process were based on strict criteria defined as mandatory, Jan Bosch, Executive Member of the Tender Committee confirms: "Essentially we based the tender on what active deployment had taught us. The criteria were defined in close cooperation with active members of the Rotterdam Fire Brigade." The PPE would be called on in a variety of different mission situations. So the specified criteria were equally diverse, which proved particularly challenging: active-duty fire fighters wanted a suit that would offer comfort during technical missions yet still provide sufficient protection in extreme flashover situations (and above all afterwards). But the purse strings were a little tight to equip approximately 500 professional and 900 voluntary fire fighters with two suits each. So the defined tender criteria called for a suit that ensures comfort and breathability in passive and active, outside deployment without cutting corners in the need for maximum protection. Put technically, this means high HTI and RHTI values, combined with a low RET value. Protection in flashover situations and the longest possible retreat windows were defined as particularly crucial safety factors (HTI24-12, i.e. RHTI24-12).

The way the city is laid out necessitates long retreat windows

The range of missions that fire brigades are asked to handle is very broad.

But the Rotterdam Fire Brigade is faced with geographical and cultural factors that make things even more complicated. Glancing at a map of the Netherlands is sufficient to show that the Fire Brigades will be confronted with a lot of water, both along the coast and inland. The urban structures are additional factors: strung-out, rural settlements further inland, with urban conurbations and large corporate complexes, ports and chemical or industrial companies hugging the coastline. There is another important factor in Rotterdam. And here we see why the retreat window is so important. The old town of Rotterdam was razed during the Second World War. Afterwards the city centre was modernized - the only Dutch city to experience this kind of redevelopment - and reconstructed almost exclusively using high-rise blocks. For fire fighters, this means that teams on the ground are forced to penetrate further and further into the buildings whenever a fire breaks out inside. So the retreat window must also factor in this time. Substances and chemicals used in the building and its furnishings are further aggravating aspects, thus heightening the risk of flashover. The committee planned to counter this hazard by using an extremely high insulation coefficient, i.e. an extended heat transfer time (high HTI, i.e. RHTI).

Defining specifications based on mission purposes

So the people in charge in Rotterdam set about moving from a very practical vision to a set of specifications, defined on paper. Aspects were added to EN469 to accommodate empirical values and the results of individualised tests and ultimately to produce the relevant standards in the invitation to tender. "We wanted practical necessity to define the clothing

specifications. We were particularly concerned to specify values transferred to paper from practical experience, and not the other way round. The standards we produced in this way exceeded the scope of EN469, or added criteria we felt were important", says Jan Bosch. Product durability was another important criterion in the tender of the new PPE. The standards defined a service life of ten years, also a review of operational fitness of all suits after four to five years. The committee also stated that the strip markings, as the "most exposed elements" on the clothing, would be authoritative in terms of durability. Therefore, this aspect (beyond 'visibility' as defined in the standard) became an important element of the overall requirements. The committee decided on PBI® Matrix® as outer material, thanks to its break-open properties and enhanced durability. The jacket was also required to include an integral system for third-party rescue.

Chronology in the decision-making process

A three-stage decision-making process was conducted once the general specifications had been defined and sent to all bidders. The idea according to Jan Bosch was to keep the procedure as comprehensible as possible: "The three phases in the decision-making process were intended to guarantee transparent and objective management, in which each phase could mean the end of the road for a bidder. The initial situation had been clearly communicated to all bidders. Now it was important to identify the best possible product - on paper and in practice." The first stage involved comparing the written concepts for correspondence with the required criteria. The overall concept, including price, design, and methods for

PERSONAL PROTECTIVE EQUIPMENT

solving the required criteria, was crucial here, and not just the technical stats. Afterwards, a second stage involved putting the best entries through their paces in rigorous practical tests. The test phase consisted of two practical blocks: a 'cold test' and a 'hot test'. In both blocks, several active duty fire fighters were kitted out with the suits. They were asked to complete a series of mission situations, which each participant completed in a different sequence to improve comparability. The simulations in the cold test involved technical mission scenarios (active and passive), while the warm test consisted of active and passive fire fighting deployments inside and outside. Additionally, the clothing was tested for extreme resilience in a wet and dry state and in fire containers, exposing each of the clothing elements to a maximum temperature of 600 °C.

The final stage involved another review of the overall concept under consideration of the real test results; in this, the 'total cost of operation' (procurement costs, maintenance costs, repair, durability, etc.) represented an important criterion. Across the board, TEXPORT® proved convincing: TEXPORT® edged in front with its patented X-TREME® compound in the specifications relating to breathability, wearing comfort, and thermal protection (in terms of direct flame exposure and radiant heat). The Triple Fabric® reflective strip by TEXPORT® was just as faultless in satisfying the requirements defined for the strip materials. This quickly prompted the committee members to shortlist the suit for container and practical tests. Here again, the model scored full marks: "We decided to use Texport because the product was unreservedly convincing in terms of its concept, the quality of workmanship, and its test performance. The assessment of total operating costs, itself hardly inconsequential, actually made it an obvious choice", says Jan Bosch.

Contract awarded to TEXPORT® thanks to its overall concept

The TEXPORT® bid involved an adapted version of the Fire Drag Rescue jacket. An outer, eye-catching grab strap guarantees quick and easy access to the rescue system, even in tricky circumstances and poor visibility. The rescue strap is

fully integrated in the upper-body part of the jacket. Running from the back and around the chest and arms, the system ensures comfortable use during rescues. The system's special design prevents the material from cutting in the armpit region when dragging or carrying the injured person out of the danger zone. PBI® Matrix® was used as outer fabric in both the jacket and the trousers. As material compound, the patented X-TREME® satisfied all requirements placed in the suit. Highest insulation coefficients and extended retreat window while retaining the best possible breathability matched the precise criteria that the executive committee felt were crucial. The Fire Action Matrix model was adapted to suit the specific needs of the trousers. They also use X-TREME® and therefore provide the ideal material compound. TEXPORT® highlights such as the textile Triple Fabric® reflective strips or the HPX-System® for fast and easy zipper repair were additional criteria in the decision, especially with regard to the total cost of operation and durability.

"It wasn't the committee that chose Texport as the winner; it was the decisionmaking process in itself." The objective and transparent design of the tender invitation effectively prevented any personal preferences encroaching on the decision-making process," says Jan Bosch. The speed with which the decision was made plainly indicates the structure and clarity of the specifications, as well as how well TEXPORT® succeeded in satisfying the requirements: "Once we had received all test results, overall concepts, and final reports, it didn't even take half an hour to choose Texport as the winner," said Jan Bosch, looking back. "The differences in product quality were simply so striking that it didn't call for a lot of thought. Particularly the initial practical experience and the positive feedback from the people using the clothing day to day in active service confirm that we made the right decision, of course."

The first 1,900 sets were delivered to the Rotterdam Fire Brigade at the end of last year. The other 700 sets will be delivered by the middle of this year, fulfilling the total order volume.

For more information, go to www.texport.at



Images courtesy of TEXPORT



During the damping-down operations two users of breathing protection from the Imst Town Fire Brigade were in action, each secured with an MSA AirGo self-contained breathing apparatus with an integrated alphaFP fall protection harness. The alphaFP harness prevented Manuel Wieser from a dangerous fall from a height of 6 metres and saved his life.

Since 1914, MSA's mission to protect people at work has never changed. As the leading global company dedicated to safety, we are proud of our heritage. But, it's our customers' lives we value the most.

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The Stealth Killer of First Responders: Part 2

In the previous issue we discussed the definition for situational awareness and shared some examples for how situational awareness can be impacted. In this installment you will be provided with ten situational awareness best practices.



Dr. Richard B. Gasaway Fire Chief (ret.)

his list was developed based on research I conducted with expertlevel fireground commanders. This list is not a prescription for success. Rather, the recommendations are designed to help you over come some of the more pervasive situational awareness barriers.

Responders Must Capture and Process Critical Cues and **Clues to Project Future Events**

As a responder conducts a size-up (e.g., at a residential dwelling fire) there are dozens, perhaps hundreds, of cues and clues that can indicate what is happening and can help responders make accurate predictions about future events. Based on the findings in the literature and the input from experts who participated in my research, the most pertinent cues and clues at a residential dwelling fire may include:

- A An evaluation of smoke and fire conditions
- **B** Consideration for the construction and level of decomposition of the structure
- C The speed the incident is moving; and,
- D A realistic assessment of savable lives in the IDLH environment.

Responders Should Set the Strategy and Tactics Based on Available Resources

Staffing issues were significant factors that cause responders concern and can impacted their SA. The expert responders I interviewed recommended conducting continual assessments of the scene until sufficient staffing (e.g., based on quantity, quality, training and experience) arrives on the scene. The experts cautioned against setting a strategy and committing to tactics until the proper quantity and quality of personnel are present to accomplish the tasks.

Dr Richard B. Gasaway joined the fire service in 1979 and has worked for six emergency services agencies including serving as a career fire chief for 20 years. Chief Gasaway's doctoral research is focused on the neuroscience of decision making under stress and the barriers that impact situational awareness. He has delivered more than 2,000 presentations on safety and leadership topics throughout the United States, Canada, England, Hong Kong and Australia.





Responders Should Develop and Maintain a Big-Picture **Focus of the Incident Scene**

Repeatedly, the expert responders I interviewed noted they were impacted when their attention was narrowed because they focused their attention to one area of an incident scene or to one task being formed. The experts recommended developing and maintaining a big-picture focus of the incident by developing metaawareness, a conscious awareness of the larger incident scene and purposeful avoidance of narrowing attention to one task or one area of the scene.

The person in-charge (i.e., The Incident **Commander) Should Not Perform Hands-on Duties**

The expert incident commanders I interviewed frequently noted that among the most insidious ways their awareness is impacted is when they performed hands-on fireground duties and consequently this caused them to overlook critical cues and clues and it caused them to lose track of the speed at which the incident was changing. Expert commanders recommended

displaying self-restraint by avoiding the temptation to be drawn into performing non-command tasks (i.e., pulling/ advancing hose lines, setting fans or ladders, connecting hose to a fire hydrant, or serving as the pump operator).

Responders Cannot Listen to and Comprehend Multiple **Conversations Simultaneously**

The responders I interviewed described multiple scenarios where their SA had been impacted because they missed important radio messages from commanders or other responders operating on the emergency scene. This was especially problematic when the radio messages were transmitted from crews operating in hazardous environments. Responders noted it was nearly impossible to listen to and comprehend simultaneous messages, be they from multiple radio channels or during faceto-face communications. The experts recommended giving priority attention to the radio messages of responders operating in hazardous environments. This may be facilitated by operating on a single operational channel or by assigning someone to monitor radio traffic of crews operating in hazardous environments.

The Incident Commander Should be Far Enough **Back From The Incident to** See the Big Picture

The expert commanders I interviewed were split in their opinions on the best place to run command. Some noted they preferred to be outside a vehicle, in the front yard or standing on the street where they noted they benefited from being able to use all of their senses to capture cues and clues on the scene. Other incident commanders noted they preferred to be located in a vehicle where they described the environment as calm and free of distractions and interruptions. The one universal recommendation from all the commanders, regardless of where their command location started, was when the incident became complex or they were being overwhelmed they preferred to be remotely located. Every commander interviewed noted they had retreated to the sanctity of a vehicle under extremely stressful conditions. The commanders also stressed the importance of completing a thorough size-up including a three-sixty walkaround prior to assuming a position that is physically out of the action.

Responders Should Take Steps to Control Distractions and Interruptions

Responders spoke frequently about how distractions and interruptions impact their SA. Commanders of residential dwelling fires noted that police officers, occupants, neighbors, bystanders, utility company workers and other firefighters offering unsolicited advice were among the culprits that distracted their attention away from the big picture incident. The experts recommend a degree of self-discipline to stay on-task, a willingness to tell those wishing to speak face-to-face to refrain from interrupting the responder who is listening to radio traffic from personnel who may be operating in high hazard environments. For incident commanders, the experts recommended being located out of visible sight of the persons who might distract their attention.

Responders (Including Commanders) Should **Manage Their Span of Control**

The experts noted it was easy to get overwhelmed if they had to perform too many command roles, had to process too much information, had to listen to multiple radio channels, and/or had to complete a size-up while focusing on the safety of the personnel deploying in the firefight. The experts note that assigning subordinate command duties (e.g., safety, staging, and operations) was essential to keep the incident commander from being overloaded. The experts spoke favorable of assigning a person to serve as an aide, noting the aide can free the incident commander's mental capacity to concentrate on the most important aspects of the fireground operations. The presence of a senior advisor to help the incident commander with the delegation of duties was also very beneficial. The use of a unified command, where ranking officers from all agencies involved are physically located together, facilitated an efficient distribution of duties and a sharing of knowledge that enhances commander SA.

The Incident Commander **Must Establish and Maintain** a Strong Command Presence

The experts noted it was important to establish a strong command presence by displaying confidence and focused leadership at the incident scene. The experts noted that in order to accomplish this, it was essential to display emotional self-control especially during the most stressful periods of an incident. They noted their behavior and demeanor often sets up the incident for success or failure because crews react based on the behavior and demeanor of the commander.

The experts also noted it was very important to control the action of crews, ensuring personnel do not engage in independent goal setting (freelancing) and that commanders know where personnel are operating and what they are doing at all times. The experts noted it is also very important to be clear, concise, articulate and confident when giving orders. They were also strong advocates for the need to be consciously aware of the passage of time, noting the commander may be

the only one with access to a watch or clock to mark and keep track of the passage of time.

Responders Should Accelerate Their Expertise

The experts spoke openly about a general reduction in the number of residential dwelling fires over the past twenty years. The reduction in actual fires impacts the ability of responders to develop and maintain skills. The experts noted this is why it is so important to conduct realistic training, noting that challenging real-life training scenarios help to develop responder skills and enhance a responder's ability to make good decisions under stress. The experts also strongly recommended the use of simulations, as well as using case studies and watching video clips of fire incidents. The experts were also strong advocates for using near-miss reports to accelerate learning based on the mistakes of others. They also spoke favorably of the valuable lessons that can be learned from line-of-duty death investigation reports. Performing post-incident evaluations after each

emergency was another way the experts recommended for identifying potential issues and to reinforce the application of best practices. Finally, the experts recommended that developing supervisors and incident commanders be paired with a mentor who can provide coaching and feedback so the novice supervisor/commander can learn from mistakes, even if the outcome of the error was not a nearmiss or casualty incident.

In high stress emergency settings, failing to capture critical incident cues and clues, failing to comprehend those cues and clues in to something meaningful, and failing to use that meaning to project future events is the recipe for near-miss and catastrophic events on the fireground. The foundation to good decision making lies in the ability to develop and maintain strong situational awareness... so you can see the bad things coming in time to change the outcome.

For more information, go to www.SAMatters.com



New Car Technology: Part 1

"The cars we are cutting up in the junk yards aren't the cars that are crashing on the highway"



Doug W. Cincurak

Doug Cincurak is a Captain with the city of Green Fire Department where he has served as a Firefighter/ Paramedic for 29 years. Doug has extensive training experience and knowledge in vehicle extrication and stabilization. He has taught extrication and stabilization classes throughout the USA and Canada.

his is the first of two articles on new car technology. Firefighters in the fire service today have more demands placed on them than ever before. We must know about lightweight truss construction, rapid intervention teams, saving our own and now weapons of mass destruction. While I believe this is very valuable training and certainly important to the fire service, I also believe the knowledge skills and abilities associated with vehicle extrication have not kept pace with the technology of the auto industry.

Back in the 1970's the big buzzword in the fire service was extrication and EMS, in the 1980's it was Haz Mat, in the 1990's it was Technical Rescue, now we have WMD. With the way the auto industry has changed the safety features of cars today, I think it is time we revisit vehicle extrication.

During the past several years I have been teaching auto extrication to fire departments, I have learned a few things, one is most departments have little knowledge of new car technology as it pertains to vehicle extrication and they are using antiquated techniques taught when they first joined the fire service.

Sure everyone knows that cars today have airbags in them, but do you know how to avoid them and still perform an extrication without injuring yourself or the patient? Are you aware of the new types of steel auto makers are using in the cars on the road today? Do you know if your cutters have the capacity to cut a triple rolled high strength low alloy steel A post?

In this article we will take a look at some of the new car technology as it pertains to vehicle extrication. We will talk about some of the different types of steel used by the auto makers today. We will also look at seat belt pretensioners and the different types of airbags we may encounter.

Types of steel used in vehicle construction

In today's autos you will find a wide variety of steel used to construct these vehicles. There are Mild Steel, High Strength-Low Alloy Steel, Ultra High Strength Steel, Cast Magnesium and now we are running into Boron Steel tubes in the A-post.

Auto manufacturers are using more high strength steels in their operation than ever before. The main reason is they can use thinner metals and get greater strengths. High Strength low alloy steels provide greater strength with less mass and that in turn provides as much as a 30% weight reduction as compared to mild steels. High strength steels also absorb more energy per pound than mild steels making them more crash worthy.

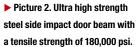
Manufacturers are placing crumple zones into this high strength steel. These body parts are designed to crumple in a predetermined pattern to absorb the energy produced during a collision while maintaining the integrity of the passenger compartment.

One question I want you to ask yourself as you read about the different types of steel is, "Can my extrication equipment do what is needed on these newer cars?" If you don't know, research the data on your existing equipment. Find out what your spreaders, cutters and rams are capable of doing.

We took a good look at this a few years ago on my fire department and found that our equipment would not meet the challenges newer cars present. It had taken us two years to convince the Mayor to allow us to purchase new tools. My point here is, is even though you read this article and go out and get more education on new car technology and extrication, change is slow. Don't get discouraged if your request for



▲ Picture 1. The yellow shaded areas are where the manufacturer has used high strength-low alloy steel.





new equipment is denied at first. Keep after it with more and more supporting documentation and hopefully it will happen. Extrication seems to have taken a backseat to all of the other things we need to learn and do as firefighters. The way the auto industry is building cars now, it is forcing us bring auto extrication to the forefront again.

Mild Steel

Mild steels are the softer steels that most of us are familiar with when it comes to vehicle extrication. The most common areas we find this type of steel is in the rocker panels, floor pans, quarter panels and fenders. This type of steel will cut very easily and when we use our spreaders and rams, we don't often have trouble moving this type of steel. Generally most people have problems when they attempt to use mild steel as a hard push point. This steel will move before the object they intended to move and the operator will not achieve the result they desired. These areas should be considered soft push points during your extrication.

High Strength Steel

This type of steel has relatively the same qualities of the mild steel. Some of the uses are in the hoods, door skins and quarter panels.

High Strength - Low Alloy Steel

This type of steel is used in the construction of the pillar posts, side members, front and upper rails and the shock tower supports. These types of

steel have high tensile strengths and are used to give the auto support. When used in the A,B and C pillar posts, it gives the car better rollover protection and helps keep the roof from collapsing in on the occupants.

High Strength - Low alloy steel will be harder to move with our spreader and ram (see picture 1 above). These areas will work well as hard push points during your extrication. Older cutters may not have the capacity to cut a triple rolled high strength low alloy steel A or B post.

Ultra High Strength Steel

Ultra high strength steels have incredibly high tensile strengths, some have upwards of 180,000 psi tensile strength. You will find this type of steel in the side impact door beams, reinforcement bars under the dash and bumper reinforcements. Only attempt to cut this

type of steel if it is absolutely necessary it may fragment (see picture 2 above).

Look at the size and shape of the older style side impact protection system in the photo above right. There have been cases during off center front end collisions where the side impact beam will pierce the door and lodge itself into the B-post. This acts just like the deadbolt on your door at home. You will not be able to open the door with your spreaders if this happens. Your best bet to get this door open is to start on the hinge side, cut the hinges and attempt to remove the door from there.

New Style Side Impact Protection

Picture 3 below reflects a newer designed side impact protection system. This newer design protects the occupants with three separate protection systems.



VEHICLE EXTRICATION



The first is an ultra high strength beam running through the middle of the door. The second is a boron steel insert at the top of the door and the third is a honeycomb section at the bottom of the door.

Boron Steel

Car manufacturers are now using boron tubes in the A-posts of some vehicles.

These boron tubes can have tensile strengths as high as 150,000 psi. There have been cases where fire departments attempted to cut the A-post with older style cutters and were unsuccessful.

What they found after researching this further was a boron tube placed inside the A-post to give the A-post added strength during a rollover type accident (see picture 4 above).



With all of the new techniques that are being taught today, the cutter is most used tool you will carry. When I first started in the fire service years ago, we were taught to spread everything and cutting was something you rarely did. Today you will use your cutter 60% - 70 % of the time. You need to have a large capacity cutter in your arsenal that will do the work necessary on today's vehicles.

Picture 5 below shows the Hurst MOC cutter cutting the boron steel A-post. Notice in the photo that the Hurst cutter is able to cut this boron tube in the center of the blade. This is very important, other manufacturers say they are able to cut a boron tube but it has to be cut at the notch located at the rear of the blades. With the larger diameter of this boron tube and the triple rolled steel surrounding the tube, you may not be able to make your cut at the notch. Be wary of claims made by any manufacturer and test this equipment yourself before you purchase it. There are tests that NFPA has established for cutters, educate yourself on these tests and require your equipment manufacturer to perform these tests at their demonstration. There are different levels of criteria for cutters, require the cutter you choose to pass the highest levels established by NFPA. Remember, your cutters are going to be doing the majority of the work on newer cars. Demand the best equipment available for your fire department.

Cast Magnesium

Some car manufacturers are using cast magnesium in the transverse dash beams. It runs from one side of the car to the other near the top of the dash area. Auto manufacturers are using these to give the car more lateral stability and they are using them to hang all of the components on the dash. This helps us when we are doing a dash roll up because all of the components move with the beam. One of the drawbacks to this technology is during a car fire. The amount of magnesium used in this technology isn't a lot but we all know what happens when we put water on magnesium as it burns.

For more information, go to www.footagerescue.com





Leadership & Lifelong Learning for Officer Development

The competent fire officer must be guided in their decision-making by a combination of knowledge, skill, and experience. As a means to enhance experience and support professional development, fire service leaders should embrace the concept of Lifelong Learning.



Michael Warmuth M.S., CFO

he modern fire service continuously faces new and complex challenges. To remain prepared to confront these challenges and increase public awareness about fire prevention, fire officers must continuously adapt to their learning environment. Organizations whose members are not engaged in regular learning often make the same mistakes over and over again, sometimes culminating in tragedy.

Peter Senge, founder of the Society for Organizational Learning, reminds us that "we learn best from our experience. but we never directly experience the consequences of many of our most important decisions." We all learn from our mistakes, when the stakes are high we may never get that second chance.

Lifelong Learning

Lifelong Learning is continuous, deliberate, and self-motivated. Committed fire officers routinely seek information for personal as well as professional reasons. When learning is personally relevant to

'Leadership and learning are indispensable to each other'

John F. Kennedy

our interests and goals it enhances skill, improves job performance, and develops a higher level of thinking.

When this happens, the motivation to learn is high and leaders pursue new learning opportunities as a basic human need to develop and grow (Stanford, 1998).

Adapting to new technologies

Numerous learning opportunities are present in a variety of formal and informal training and educational networks. In the digital era, we have amplified access to the conventional forms of learning including college programs, videos, and trade journals. Over the past several years, there has been a rapid expansion of non-formal learning opportunities



Michael Warmuth is a Battalion Chief with the Eagle River Fire Protection District in Avon, Colorado



including blogs, podcasts, and videosharing websites.

The increase of information sharing has had a remarkable impact on our industry. With the advancement of contemporary learning methods, we've seen a new level of engagement from our members outside of the halls of timehonored educational institutions.

Continuing education and learning is no longer held exclusively to traditional training systems. With this technological expansion, we have seen an increase in commitment from all roles and ranks in the industry. Self-motivated and active members of our organizations are no longer restricted to the classroom or peer reviewed journals to share their ideas, techniques, and feedback. Popular firefighter web-blogs have a comparable readership to many industry-based publications. One powerful example is Irons and Ladders, a firefighter-run forcible entry blog that has received as many as 30 thousand views in one day (Royal, 2014).

The committed Lifelong Learner should welcome a combination of traditional and non-traditional learning programs. The key is to appreciate is that maximum learning will occur when fire officers blend the two learning styles and not view them in conflict with each other.

Leverage the **Overlapping Resources**

Amid the rapid growth of information, it becomes increasingly important for fire officers to develop an ability to navigate through the medley of data and advice to find the most valid and relevant material.

As an institution of learning, the library has been a cornerstone for new

ideas and progress. The United States Fire Administration (USFA) Library has continued to adapt to emerging technologies to ensure the endurance of its legacy. Recently, the USFA Library in Emmitsburg, Maryland has worked to provide greater access to fire and emergency services literature and resources outside its library walls.

The USFA Library, commonly known as the Learning Resource Center, contains one of "the most comprehensive collections in the United States of materials relating to the fire service and emergency management" (FEMA, 2008). This exclusive collection focuses on literature specifically related to emergency response, fire prevention, homeland security and a myriad of leadership topics.

The library has recently completed a major project that has made much of their material discoverable in the WorldCat search engine (Metz, 2013). WorldCat is the world's largest database of library materials and is universally available at any library in the world. The materials available through this enhanced cataloging system includes thousands of fire and emergency services books and videos in addition to several hundred professional journals and magazines. All of these materials are available online or through interlibrary loan agreements with your local library through their online catalog, twenty-four hours a day, and all at no cost.

More with Less

During a time when public-sector leaders are being asked to do more with less, the difference between success and failure often depends on how we use our time. The USFA Library has innovative quick access programs that will maximize a leader's time and provide immediate access to recognized fire prevention and life safety programs.

Solutions for Critical Issues

Among the online programs designed to operate as a consolidated clearinghouse to maximize a leader's time and provide immediate access to recognized programs stands a unique component of the USFA Library that sets itself apart from other venues for Lifelong Learners. The library has made the collection of Executive Fire Officer (EFO) Applied Research Project papers available through WorldCat. This body of work that once sat idle among the stacks for on-site users only is now available electronically.

The Executive Fire Officer Program is delivered by the United States Fire Administration's National Fire Academy. The National Fire Academy provides specialized training courses and advanced management programs for middle and top-level fire officers. The Executive Fire Officer Program provides senior fire officers with a comprehensive curriculum on various aspects of fire and emergency services to develop an officer's leadership and ability to contend with difficult and adaptive problems in their respective jurisdictions (FEMA, 2014).

As a graduate level development program, the Executive Fire Officer Program requires students to complete an Applied Research Project to address a specific challenge within their organization. With focus on applied problem solving to real world leadership challenges, the papers "have led to numerous improvements and changes to communities" throughout the United States (Metz, 2013).

Although most students in the

'Tomorrow's illiterate will not be the man who can't read; he will be the man who has not learned how to learn'

Alvin Toffler

Executive Fire Officer Program are from the United States, the program has students and graduates from Canada, Guam, Brazil, St. Lucia, Germany, China, Australia, and New Zealand in addition to U.S. military personnel from Japan, Turkey, Saudi Arabia, Germany, and Italy.

A recent paper on response delays related to increased railroad activity resulted in millions of dollars in grant money for a particular jurisdiction. Upon submission of the research project, the applied solution was implemented in the student's home community and presented to local and state officials resulting in improved response times for the community and decreased risk to emergency responders (Krantz, 2014).

Currently, over 7,000 papers are available on-line. Each paper is searchable by topic or keyword allowing users to locate and apply a wide variety of solutions from the industry's top leaders. Placing this collection of extensive work on the web and into WorldCat provides tremendous access to an exclusive resource for the entire first responder community.

Conclusion

In order for an organization to maintain the flexibility and adaptability required to confront new and complex challenges, leaders need to discover how to tap into their people's commitment and capacity to learn. Given that all members of our organizations have the aptitude to learn, many lack the tools and guidance to prepare them for the situations they face. Fire officers that are adept to search out new and innovative learning opportunities for themselves and their staff will develop an atmosphere of enduring excellence among their members.

The development of digital content will remain a focus for Life Long Learners. A visit to today's USFA Library continues to avow the iconic images of books in stacks and a peaceful retreat for study. Yet the resources, programs and services that abound outside the building also serve to

'An investment in knowledge pays the best interest'

Beniamin Franklin

National Emergency Training Learning Resource Center

Mission:

- Support the National Fire Academy and Emergency Management Institute's instructional and research programs through ownership of or access to appropriate print and other materials.
- Provide assistance to FEMA and other DHS offices as well as to the general public in their search for useful information.
- Promote the better understanding of effective ways to use these resources by NETC students, faculty and the first responder community across the United States.

Resources:

- www.usfa.fema.gov/data/library
- 6,000 videos
- 7,000+ published papers by NFA students
- 18,000 books
- 120,000+ individual journal articles

Fire Prevention and Public Education Exchange

www.usfa.fema.gov/library/catalog/ exchange.shtm

Contact Information:

Address: Learning Resource Center

16825 South Seton Avenue Emmitsburg, MD 21727

netclrc@dhs.com E-mail: Phone: 1-800-638-1821

301-447-1030



nages courtesy of NETC Library Photo

provide new access to critical information and ideas that will help fire officers make timely and appropriate decisions.

The library's improved approach provides Lifelong Learners with greater access to the best ideas and solutions in leadership, training, and fire prevention.

For fire and emergency services leaders there will always be new ideas and opinions to explore. According to Edward Metz, Head Librarian at the National Fire Academy, the library will continue to serve as a "curator" to help the public make decisions and navigate through the noise and volume of information to find material they can trust and use (Metz, 2014).

Not only does the Untied States Fire Academy Library remain an enduring resource for Lifelong Learning, it continues to provide fire service leaders the greatest

opportunity and accessibility to unlock and enhance the talent and best minds of our industry.

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DSTS-3P4-5	5	14800	18", 4-Blade	73 lbs.	22" X 21" X 17"
DST-3P4	5.5	14885	18", 4-Blade	81 lbs.	23" X 23" X 21.5"
DDST-3P4	5.5	14885	18", 4-Blade	82 lbs.	23" X 23" X 21.5"
DST-3P4-L*	5.5	14885	18", 4-Blade	85 lbs.	23" X 23" X 21.5"
DST-3P4-6.5	6.5	17000	18", 4-Blade	91 lbs.	23" X 23" X 21.5"
DST-9P4	9	17500	20", 4-Blade	115 lbs.	26" X 23" X 21"
DST-13	13	22000	24", 4-Blade	136 lbs.	30" X 28" X 24"

ELECTRIC MODELS

Model	HP	Output (CFM)	Prop Size	Weight	Dimensions
E18SP	2	12000	18", 2-Blade	85 lbs.	21" X 21" X 18"
E18P4	5	22000	18", 4-Blade	88 lbs.	23" X 23" X 16"
EB18SP	1.25	12000	18", 2-Blade	90 lbs.	21" X 21" X 19"
EX18SP	2	12000	18", 2-Blade	110 lbs.	21" X 21" X 18"

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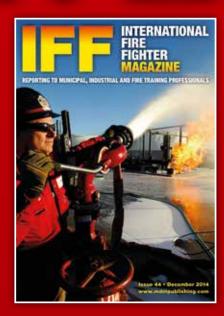
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ADVERTISERS' INDEX

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Armadillo Merino	27
Ballyclare Ltd	31
Bristol Uniforms	35
Cutters Edge	21
Dafo Fomtec	IBO
Or Sthamer Hamburg	19
Dynax Corporation	22
Emergency Services Training Institute (Texas A&M)	27
FDIC 2015	44 & 45
Flir Systems	57
Floodsax	11
Fol-Da-Tank	49
Groupe Leader	63
Haagen Fire Training Products	57
Hainsworth	31
Holmatro	83
Hytrans Systems	25
SG Infrasys	54
Kenex Engineering	70
Kussmaul Electronics	18
MSA	76
MSA Middle East	13
Noha Norway	27
P.B.I. Performance Products	37
PAB Akrapovic	32
Pacific Helmets (NZ) Ltd	50
Paratech Inc	34
Pyrolance LLC	60
Rosenbauer International	ОВО
Sapphire Complete Training Concepts	25
Scott Safety	58
Skedco Inc	7
Solberg	64
Super Vacumn Manufacturing	62
Task Force Tips	IFC, 1 & 73
Feikoku I-Sen Co Ltd	15
Texport	28
The Purple Company	11
Jnifire Power Blowers	87
/step Simulation	70
Naterous Company	67
Nehr Engineering / Glasmaster	37 & 83
NS Darley and Company	41
one Corporation	2



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Dafo Fomtec AB P.O Box 683 SE-135 26 Tyresö Sweden Phone: +46 8 506 405 66 Fax: +46 8 506 405 29 E-mail: info@fomtec.com Web: www.fomtec.com

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